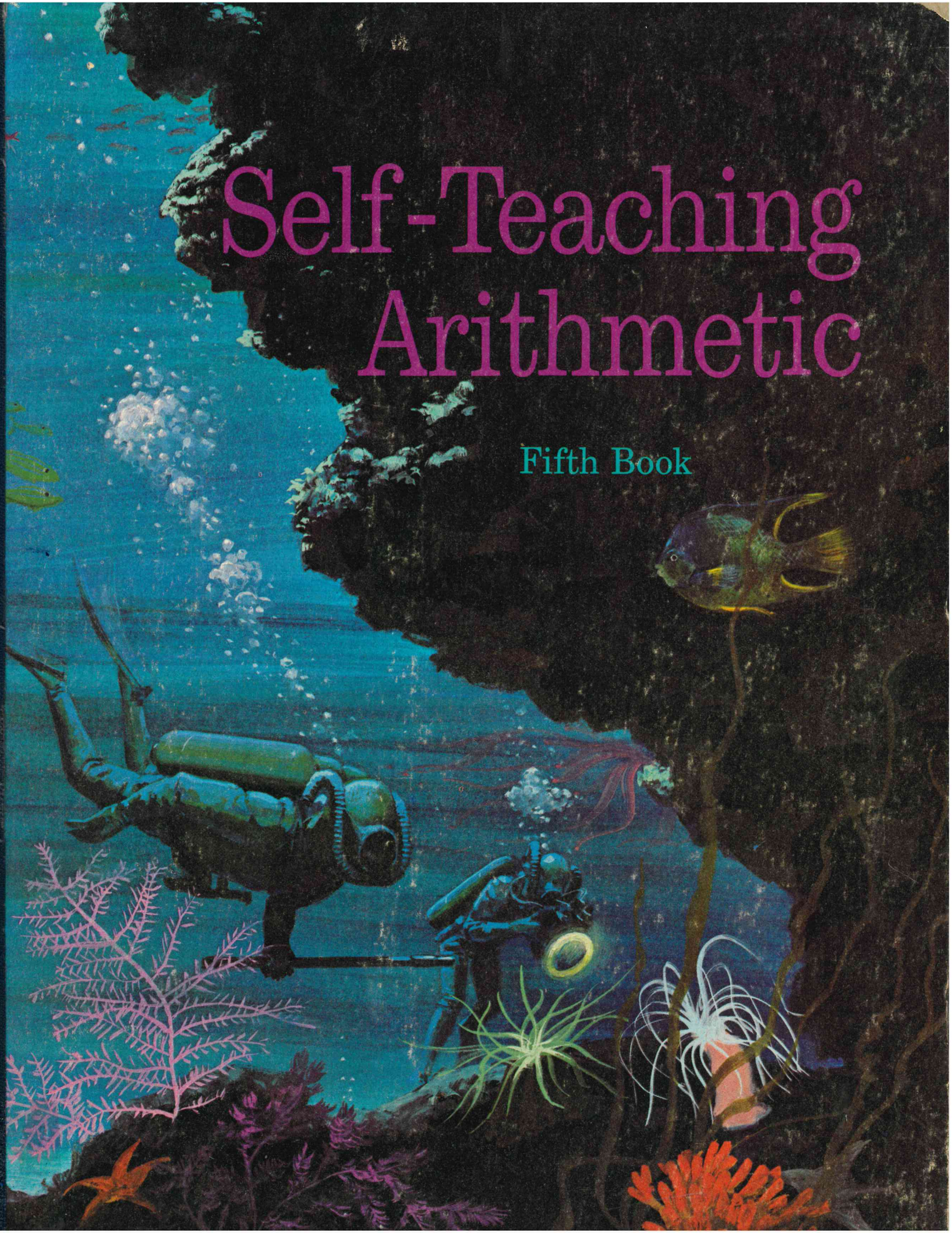
# Self-Teaching Arithmetic

## Fifth Book



Fifth Book

# Self-Teaching Arithmetic

Self-Study

Self-Test

Self-Check

By John W. Studebaker
Vice President, Scholastic Magazines
U.S. Commissioner of Education (1934-1948)
and Gordon Studebaker
Western Regional Director, Scholastic Magazines

*Illustrated by ORIN KINCADE*

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# How to Use This Book

This is a new kind of book designed to enable a pupil to learn at his own rate of speed. With it he can study the basic arithmetical processes, test his knowledge of them, and correct his test all by himself. The pupil will, of course, need guidance in the beginning, until he has learned the mechanics of the book. Once he understands how to work with the book, however, he will find it easy to use – and fun to use too.

Parts I and II of the book are made up of pairs of pages. One page in each pair – the Practice Page – contains 8 to 60 examples with apertures ("windows") adjacent to them. The answers for the examples show through the windows. On the Study Pages facing the Practice Pages are illustrations to help the pupil visualize the appropriate arithmetical processes. Part III usually combines both Study and Practice material on the same page.

This is how the pupil uses the Knowledge Master Book:

Parts I and II

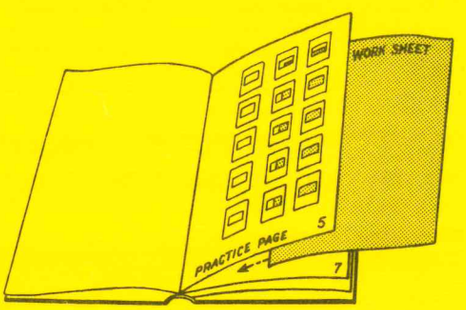
1) The Study Page in each lesson teaches him to understand the new processes introduced on the opposite Practice Page.

2) **He studies** the examples and their answers until he thinks he knows the answers to all of the examples on the Practice Page.

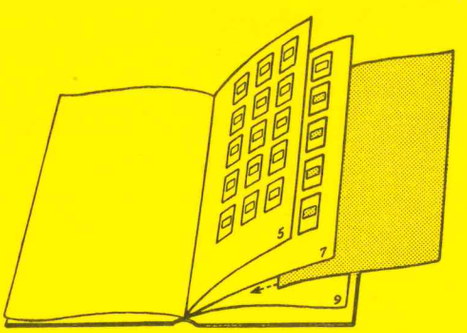
3) **He tests** himself. He puts his work sheet (a piece of paper or a Magic Slate) directly under the Practice Page. If he has been studying the examples on page 5, for instance, he puts his work sheet under page 5 – that is, between pages 6 and 7 and on top of page 7. The answers will then be hidden. If the paper he uses is not opaque enough to hide the answers, he should use more than one sheet. He writes the answers through the windows where indicated.

4) **He checks** his work. When he has written the answers to the examples on page 5, he puts the work sheet under page 7, on top of page 9. Both his answers and the correct answers will show through the windows adjacent to the examples. He checks to see where he is making mistakes. He repeats this process until he answers correctly all of the examples on the Practice Page. Then he goes on to the next lesson.

On each of the Practice Pages you will find directions telling where the pupil should put his work sheet each time. A good rule for the pupil to remember is that when he is testing himself, he will always put his work sheet under the Practice Page.




When he is **checking** his answers, he will always put his work sheet under the leaf below the Practice Page.

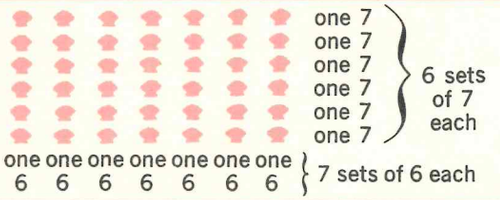



The same principle applies to Part III, where, because of the size of the windows, it was found more practicable to put fewer Practice Examples on a page and to use the remaining space for Study Panels. For fuller directions, see page 53.

## Science Corner
## THE SIXES IN MULTIPLICATION

This page is for study only. Study the panels below as you look at the examples on page 5.

**A**




$$\begin{array}{r} 6 \\ \times 7 \\ \hline \square \end{array}$$

The children had collected ▦ shells.
Six 7's are ▦ Seven 6's are ▦
▦ means "How many?"

$$\begin{array}{r} 7 \\ \times 6 \\ \hline \square \end{array}$$

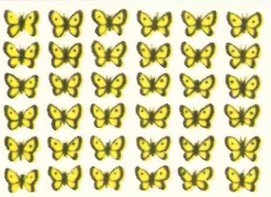
$6 \times 7 = \square$ (6 × 7 = How many?)

$7 \times \square = 42$ (7 × How many = 42?)

**B**

There were ▦ butterflies.
$6 \times 6 = \square$
Six 6's = ▦

× is the **multiplication sign**; it means **times**.



$$\begin{array}{r} 6 \text{ Multiplicand} \\ \times 6 \text{ Multiplier} \\ \hline \square \text{ Product} \end{array}$$

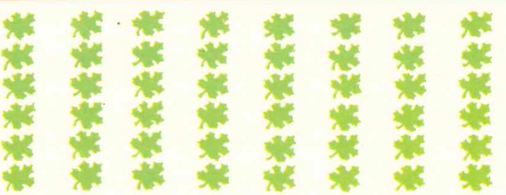
Factors

The answer in multiplication is called the **product**.

**C**

Six 8's are ▦
$6 \times 8 = \square$
Eight 6's are ▦
$8 \times 6 = \square$

$$\begin{array}{r} 8 \\ \times 6 \\ \hline \square \end{array}$$

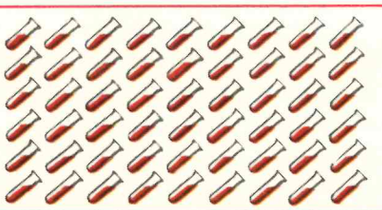


$$\begin{array}{r} 6 \\ \times 8 \\ \hline \square \end{array}$$

**D**

$$\begin{array}{r} 9 \\ \times 6 \\ \hline \square \end{array}$$

$$\begin{array}{r} 6 \text{ Multiplicand} \\ \times 9 \text{ Multiplier} \\ \hline \square \text{ Product} \end{array}$$



$6 \times 9 = \square$

$9 \times 6 = \square$

**E**

An example with an **equals sign** (=) in it is called an **equation**.
In the equation $6 \times 9 = 54$, 6 and 9 are the factors. 54 is the product.
If we rename the factors, the product will still be the same.

$6 \times 9 = 54$ $(2 + 4) \times 9 = 54$ $(2 \times 9) + (4 \times 9) = 54$
$6 \times 9 = 54$ $6 \times (8 + 1) = 54$ $(6 \times 8) + (6 \times 1) = 54$

**Renaming the factors does not change the product.**

Multiplication is a fast way of adding a number of equivalent sets.

**DIRECTIONS:** 1 — Study the examples below. The red and black numerals in the windows are the right answers. 2 — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers through the windows where the arrows point. For the examples below the windows, write your answers to the red examples where the red arrows point and to the black examples where the black arrows point. If both examples in each pair have the same answer, write it only once. 3 — To check your work, put your paper or Magic Slate under page 7. See if your answers are the same as the red and black numerals in the windows.

| | | |
|---|---|---|
| 6+6+6+6+6+6+6=▦<br>7×6=▦<br>7+7+7+7+7+7=▦<br>6×7=▦ | 6+6+6+6+6+6=▦<br>6×6=▦<br>4×6=▦<br>6×4=▦ | 6+6+6+6+6+6+6+6=▦<br>8×6=▦<br>8+8+8+8+8+8=▦<br>6×8=▦ |
| 6 7<br>×7 ×6<br>3×6=▦<br>6×3=▦ | 6+6+6+6+6+6+6+6+6=▦<br>9×6=▦<br>9+9+9+9+9+9=▦<br>6×9=▦ | 6 8<br>×8 ×6<br>1×6=▦<br>6×1=▦ |
| 6 9<br>×9 ×6<br>5×6=▦<br>6×5=▦ | 6×▦=42<br>▦×6=42<br>2×6=▦<br>6×2=▦ | Eight 6's=▦<br>Six 8's=▦<br>6×▦=36<br>▦×6=36 |
| 6×▦=48<br>▦×6=48<br>6×9=▦<br>6×(6+3)=▦ | 7×▦=42<br>▦×7=42<br>6×8=▦<br>6×(4+4)=▦ | ▦×6=54<br>6×▦=54<br>7×6=▦<br>(3+4)×6=▦ |
| 8×▦=48<br>▦×8=48<br>6×7=▦<br>(5+▦)×7=42 | Six 6's=▦<br>6×6=▦<br>9×6=▦<br>9×(▦+2)=54 | 9×▦=54<br>▦×9=54<br>8×6=▦<br>(6+2)×▦=48 |

# Mending Things
# THE SIXES IN DIVISION

This page is for study only. Study the panels below as you look at the examples on page 7.

**A**

When we divide, we put things into equal sets. ÷ is the **division sign**; it means **divided by**.

$12 \div 6$ means

1) How many sets of 6 in 12?

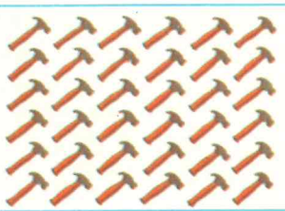
2) When 12 is divided into 6 equal sets, how many are there in each set?

56
56

49
64

63
63

**B**



$36 \div 6 = \square$

$\square$ Quotient

Divisor $6\overline{)36}$ Dividend

The answer in division is called the **quotient**.

72
72

**C**

How many 6's in 42?

$42 \div 6 = \square$

How many tacks in each of 7 equal sets?

$42 \div 7 = \square$

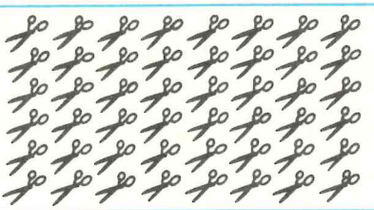
63
9

81
9

**D**

If 6 classes share 48 scissors equally, how many scissors will each class have?

$48 \div 6 = \square$



The 48 scissors came in boxes with 8 scissors in each box. How many boxes were there?

$48 \div 8 = \square$

72
9

56
8

64;3
8

**E**

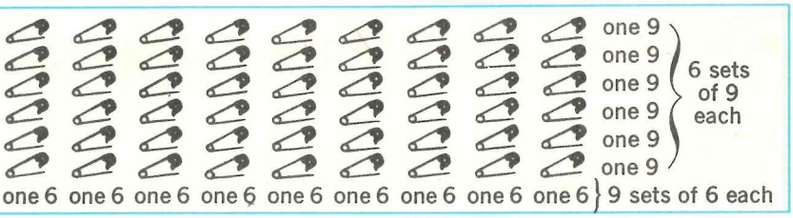
$54 \div 6 = \square$ $54 \div 9 = \square$

In 54 there are $\square$ 6's.

In 54 there are $\square$ 9's.

$\square$ $6\overline{)54}$

$\square$ $9\overline{)54}$




81;9
7

72;1
8

56;5
7

**F**

$$\begin{aligned} & 24 \div 4 \\ = & (20 + 4) \div 4 \\ = & (20 \div 4) + (4 \div 4) \\ = & \quad 5 \quad + \quad 1 \\ = & \quad\quad 6 \end{aligned}$$

24 is the dividend; 4 is the divisor. We can rename the dividend by changing it to other numerals, but we must be sure the other numerals can be divided **evenly** by the divisor.

1/6 of 24 means 24 divided by 6.

$24 \div 6 = 4$

1/6 of 24 = 4

56;4
9

49;3
9

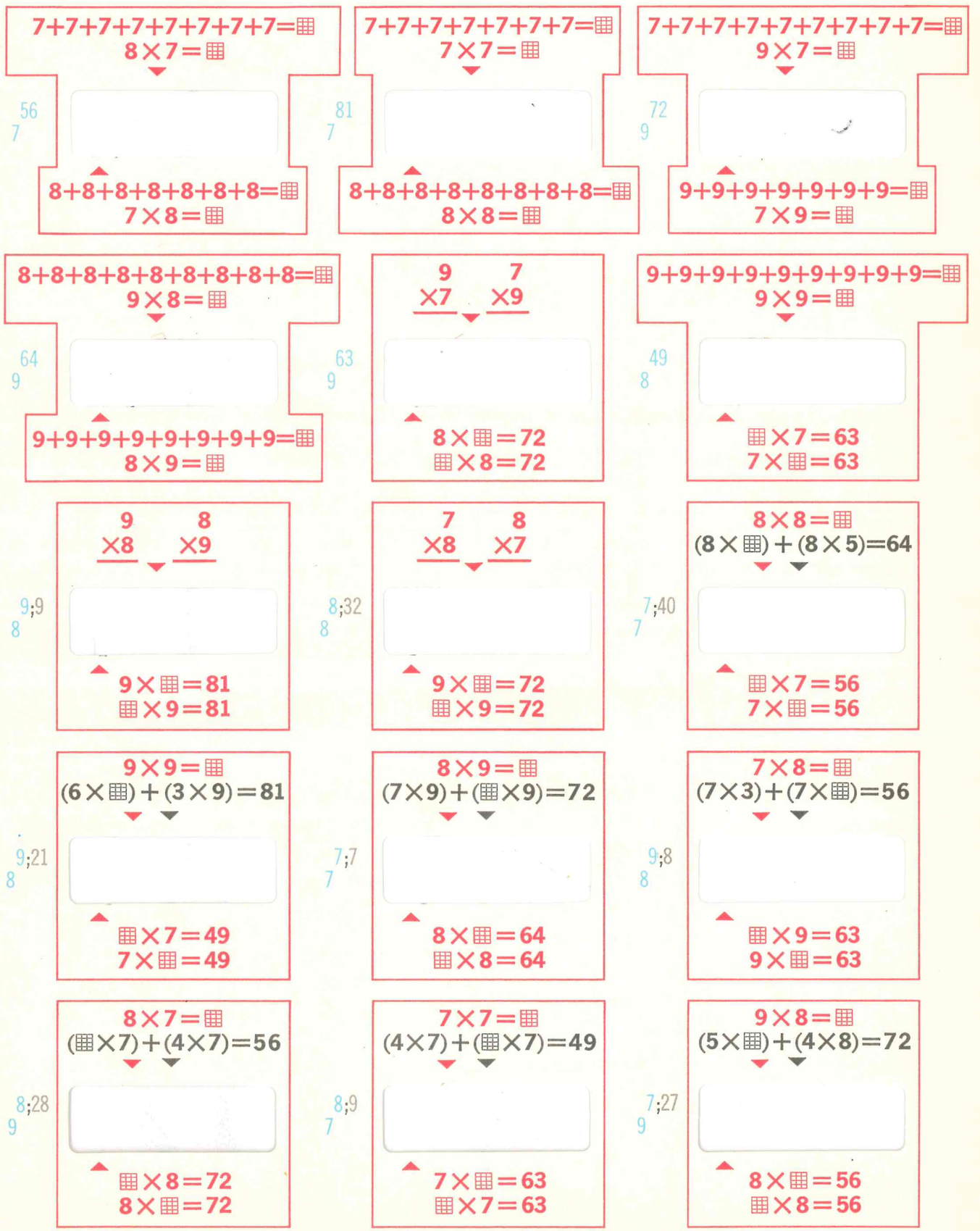
72;8
7

**DIRECTIONS:** **1** — Study the examples below. The blue and black numerals in the windows are the right answers. **2** — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers where the arrows point. For the examples below the windows, write your answers through the windows straight over the examples **or** where the arrows point (write your answers to the blue examples where the blue arrows point, and to the black examples where the black arrows point). **3** — To check your work, put your paper or Magic Slate under page 9. See if your answers are the same as the blue and black numerals in the windows.

| | | |
|---|---|---|
| □ ÷ 6 = 8<br>□ ÷ 8 = 6<br>9)54 | 42<br>42 | □ ÷ 7 = 6<br>□ ÷ 6 = 7<br>6)48 | 36<br>24 | □ ÷ 9 = 6<br>□ ÷ 6 = 9<br>7)42 | 48<br>48 |
| □ ÷ 6 = 6<br>Six 6's in □<br>6)36 | 42<br>18 | 48 ÷ □ = 6<br>1/6 of 48 = □<br>6)54 | 54<br>54 | 54 ÷ □ = 6<br>1/6 of 54 = □<br>8)48 | 48<br>6 |
| 24 ÷ 6 = □<br>24 ÷ □ = 6<br>6)42 | 54<br>30 | 1/6 of 36 = □<br>36 ÷ □ = 6<br>54 ÷ 6 = □<br>(30 + 24) ÷ 6 = □ | 7<br>12 | 42 ÷ □ = 6<br>1/6 of 42 = □<br>36 ÷ 6 = □<br>(18 + 18) ÷ 6 = □ | 48<br>6 |
| 54 ÷ □ = 9<br>54 ÷ 9 = □<br>48 ÷ 8 = □<br>(□ + 8) ÷ 8 = 6 | 8<br>54 | 12 ÷ □ = 6<br>12 ÷ 6 = □<br>42 ÷ 7 = □<br>(35 + □) ÷ 7 = 6 | 6<br>48 | 18 ÷ 6 = □<br>18 ÷ □ = 6<br>54 ÷ 9 = □<br>(45 + 9) ÷ □ = 6 | 9<br>42 |
| 30 ÷ □ = 6<br>30 ÷ 6 = □<br>48 ÷ 6 = □<br>(36 + 12) ÷ □ = 8 | 6<br>42;1 | 6 ÷ □ = 6<br>6 ÷ 6 = □<br>42 ÷ 6 = □<br>(30 + □) ÷ 6 = 7 | 36<br>54;4 | 42 ÷ □ = 7<br>42 ÷ 7 = □<br>48 ÷ □ = 8<br>48 ÷ 8 = □ | 6<br>48;6 |

**NOTE:** Pay no attention to the red and black numerals outside the boxes.

**DIRECTIONS:** **1** — Study the examples below. The red and black numerals in the windows are the right answers. **2** — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers to the red examples where the red arrows point and to the black examples where the black arrows point. For the examples below the windows, write your answers where the arrows point.
**3** — To check your work, put your paper or Magic Slate under page 6. See if your answers are the same as the red and black numerals in the windows.






**NOTE:** Pay no attention to the blue and black numerals outside the boxes.

## Musical Instruments
# THE SEVENS, EIGHTS, AND NINES IN MULTIPLICATION

This page is for study only. Study the panels below as you look at the examples on page 8.

**A**

Seven 7's = ▦

$7 \times 7 = ▦$

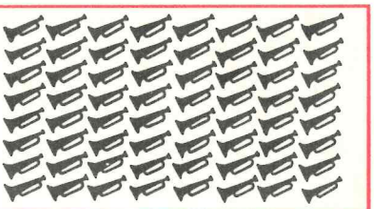
7 Multiplicand
$\times 7$ Multiplier
▦ Product

**B**

Eight 8's = ▦

$8 \times 8 = ▦$

8 Factor
$\times 8$ Factor
▦ Product



48 / 6 ▭ 42 / 8 ▭ 54 / 6 ▭

**C**

$7 \times 8 = ▦$
$8 \times 7 = ▦$

The **order** of the factors does not change the product.

$\begin{array}{r} 8 \\ \times 7 \\ \hline ▦ \end{array}$ $\begin{array}{r} 7 \\ \times 8 \\ \hline ▦ \end{array}$

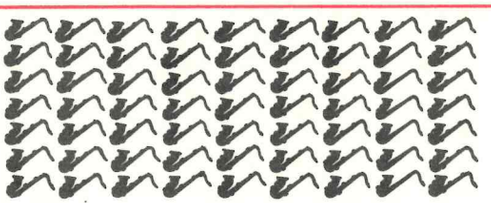
Seven 8's = ▦
Eight 7's = ▦

36 / 6 ▭ 8 / 9 ▭ 9 / 6 ▭

**D**

$7 \times 9 = ▦$
Seven 9's = ▦

$9 \times 7 = ▦$
Nine 7's = ▦

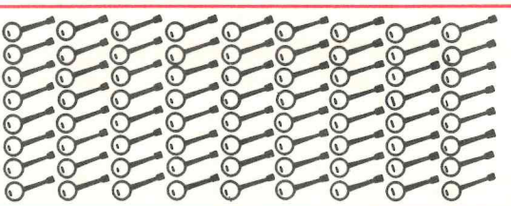


$\begin{array}{r} 9 \\ \times 7 \\ \hline ▦ \end{array}$ $\begin{array}{r} 7 \\ \times 9 \\ \hline ▦ \end{array}$

4 / 7 ▭ 6 / 9 ▭ 7 / 6 ▭

**E**

$\begin{array}{r} 9 \\ \times 8 \\ \hline ▦ \end{array}$ $\begin{array}{r} 8 \\ \times 9 \\ \hline ▦ \end{array}$

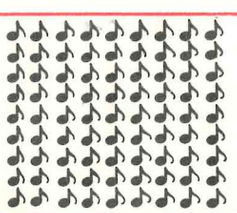


$8 \times 9 = ▦$
Eight 9's = ▦

$9 \times 8 = ▦$
Nine 8's = ▦

6 / 6;40 ▭ 2 / 6;7 ▭ 3 / 6;9 ▭

**F**



$9 \times 9 = ▦$

$\begin{array}{r} 9 \\ \times 9 \\ \hline ▦ \end{array}$

Nine 9's = ▦

**G**

Renaming the factors in a multiplication equation does not change the product.

$4 \times 7 = 28$ $(2 \times 7) + (2 \times 7) = 28$
$(4 \times 3) + (4 \times 4) = 28$ $(4 \times 5) + (4 \times 2) = 28$

5 / 8;6 ▭ 1 / 7;12 ▭ 6 / 6 ▭

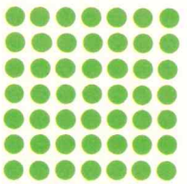
**DIRECTIONS:** 1 — Study the examples below. The blue and black numerals in the windows are the right answers. 2 — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers to the blue examples where the blue arrows point and to the black examples where the black arrows point. For the examples below the windows, write your answers through the windows straight over the examples **or** where the arrows point. 3 — To check your work, put your paper or Magic Slate under page 8. See if your answers are the same as the blue and black numerals in the windows.

| | | |
|---|---|---|
| ▦ ÷ 7 = 8<br>▦ ÷ 8 = 7<br>7)49 | ▦ ÷ 9 = 9<br>Nine 9's in ▦<br>8)56 | ▦ ÷ 8 = 9<br>▦ ÷ 9 = 8<br>9)81 |
| ▦ ÷ 8 = 8<br>Eight 8's in ▦<br>7)63 | ▦ ÷ 7 = 9<br>▦ ÷ 9 = 7<br>8)72 | ▦ ÷ 7 = 7<br>Seven 7's in ▦<br>8)64 |
| 81 ÷ 9 = ▦<br>(63 ÷ ▦) + (18 ÷ 9) = 9<br>7)56 | 64 ÷ 8 = ▦<br>(32 ÷ 8) + (▦ ÷ 8) = 8<br>9)72 | 56 ÷ 8 = ▦<br>(▦ ÷ 8) + (16 ÷ 8) = 7<br>9)63 |
| 63 ÷ 7 = ▦<br>(42 ÷ 7) + (▦ ÷ 7) = 9<br>1/9 of 72 = ▦<br>72 ÷ ▦ = 9 | 49 ÷ 7 = ▦<br>(35 ÷ ▦) + (14 ÷ 7) = 7<br>1/9 of 63 = ▦<br>63 ÷ ▦ = 9 | 72 ÷ 8 = ▦<br>(48 ÷ 8) + (24 ÷ ▦) = 9<br>1/7 of 56 = ▦<br>56 ÷ ▦ = 7 |
| 56 ÷ 7 = ▦<br>(▦ ÷ 7) + (28 ÷ 7) = 8<br>1/7 of 63 = ▦<br>63 ÷ ▦ = 7 | 72 ÷ 9 = ▦<br>(45 ÷ 9) + (27 ÷ ▦) = 8<br>56 ÷ ▦ = 8<br>1/8 of 56 = ▦ | 63 ÷ 9 = ▦<br>(36 ÷ 9) + (▦ ÷ 9) = 7<br>1/8 of 72 = ▦<br>72 ÷ ▦ = 8 |

## Geometric Shapes
## THE SEVENS, EIGHTS, AND NINES IN DIVISION

This page is for study only. Study the panels below as you look at the examples on page 10.

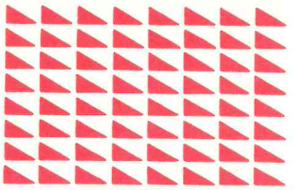
**A**



$49 \div 7 = \square$

$\square$ Quotient
$7\overline{)49}$ Dividend
Divisor

**B**



$64 \div 8 = \square$

$8\overline{)64}$

How many 8's in 64?

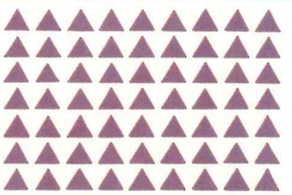
**C**



$7\overline{)56}$ $8\overline{)56}$

$56 \div 7 = \square$
$56 \div 8 = \square$

**D**



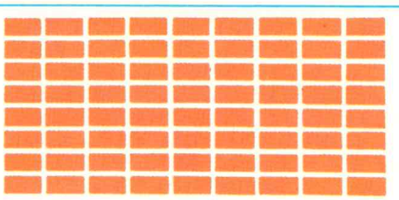
$63 \div 7 = \square$
$63 \div 9 = \square$

$7\overline{)63}$ $9\overline{)63}$

**E**

If 72 rectangles are put in 8 equal rows, how many rectangles are there in each row?

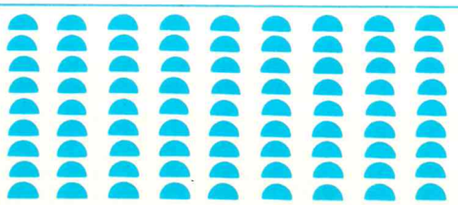
$72 \div 8 = \square$



How many sets of 9 rectangles each can be made from 72 rectangles?

$72 \div 9 = \square$

**F**



$81 \div 9 = \square$

$9\overline{)81}$

How many 9's are there in 81?

**G**

$42 \div 7 = (35 \div 7) + (7 \div 7) = 5 + 1 = 6$
$= (28 \div 7) + (14 \div 7) = 4 + 2 = 6$
$= (21 \div 7) + (21 \div 7) = 3 + 3 = 6$

Have we renamed the dividend correctly?

**H**

$1/7$ of $42 = 42 \div 7 = 6$
$1/8$ of $64 = 64 \div 8 = 8$
$1/9$ of $54 = 54 \div 9 = 6$
$1/8$ of $40 = 40 \div 8 = 5$

# RELATED MULTIPLICATION AND DIVISION
# THE SIXES THROUGH THE NINES

**A**

Terms Used in Multiplication

Multiplier → $9 \times 5 = 45$ ← Product
Multiplicand →

The multiplier and multiplicand are also called **factors.**

**B**

Terms Used in Division

Dividend → $45 \div 5 = 9$ ← Quotient
Divisor →

**C**

Look at Panels A and B.

$9 \times 5 = 45$ (product): (dividend) $45 \div 5 = 9$

Do you see that the product in multiplication becomes the dividend in division?
Do you see how multiplication and division are related?

**D**

$4 \times 8 = 32$ $\quad 32 \div 8 = 4$
$8 \times 4 = 32$ $\quad 32 \div 4 = 8$

The products in these multiplication equations become the dividends in the division equations.
The four equations are related.
We call the four related equations a **number family.**

**E**

I know that the product in multiplication becomes the dividend in division. I know that 6x8=48, so I can figure out the other equations in the number family.
6x8=48 48÷8=6
8x6=48 48÷6=8

**F**

Study these number families

| (a) | | (b) | | (c) | |
|---|---|---|---|---|---|
| $9 \times 6 = 54$ | $54 \div 6 = 9$ | $8 \times 7 = 56$ | $56 \div 7 = 8$ | $7 \times 9 = 63$ | $63 \div 9 = 7$ |
| $6 \times 9 = 54$ | $54 \div 9 = 6$ | $7 \times 8 = 56$ | $56 \div 8 = 7$ | $9 \times 7 = 63$ | $63 \div 7 = 9$ |

| | | |
|---|---|---|
| 7 × ▦ = 56<br>56 ÷ ▦ = 7<br>8 × ▦ = 56<br>56 ÷ ▦ = 8 | 6 × ▦ = 54<br>54 ÷ ▦ = 6<br>9 × ▦ = 54<br>54 ÷ ▦ = 9 | 6 × 6 = ▦<br>▦ ÷ 6 = 6<br>9 × ▦ = 81<br>81 ÷ ▦ = 9 |
| 9 × 7 = ▦<br>▦ ÷ 7 = 9<br>7 × 9 = ▦<br>▦ ÷ 9 = 7 | 8 × ▦ = 64<br>64 ÷ ▦ = 8<br>7 × 7 = ▦<br>▦ ÷ 7 = 7 | 8 × ▦ = 72<br>72 ÷ ▦ = 8<br>9 × ▦ = 72<br>72 ÷ ▦ = 9 |
| 6 × 7 = ▦<br>▦ ÷ 7 = 6<br>7 × 6 = ▦<br>▦ ÷ 6 = 7 | 8 × ▦ = 48<br>48 ÷ ▦ = 8<br>6 × ▦ = 48<br>48 ÷ ▦ = 6 | 6 × 9 = ▦<br>▦ ÷ 9 = 6<br>9 × 6 = ▦<br>▦ ÷ 6 = 9 |
| 8 × 8 = ▦<br>▦ ÷ 8 = 8<br>9 × 9 = ▦<br>▦ ÷ 9 = 9 | ▦ × 7 = 63<br>63 ÷ 7 = ▦<br>▦ × 9 = 63<br>63 ÷ 9 = ▦ | 6 × 8 = ▦<br>▦ ÷ 8 = 6<br>8 × 6 = ▦<br>▦ ÷ 6 = 8 |
| 6 × ▦ = 36<br>36 ÷ ▦ = 6<br>7 × ▦ = 49<br>49 ÷ ▦ = 7 | 7 × 8 = ▦<br>▦ ÷ 8 = 7<br>8 × 7 = ▦<br>▦ ÷ 7 = 8 | 6 × ▦ = 42<br>42 ÷ ▦ = 6<br>7 × ▦ = 42<br>42 ÷ ▦ = 7 |

**DIRECTIONS:** 1 — Study the examples on this page. The red numerals in the windows are the right answers.

2 — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows where the arrows point.

(Both examples in each pair have the same answer, so you need only write it once.)

3 — To check your work, put your paper or Magic Slate under page 15. See if your answers are the same as the red numerals in the windows.

# POINTS TO REMEMBER

This page is for study only.

350
350

3
3

20
20

**A**

In the equation $7 \times 8 = 56$, 7 and 8 are the factors and 56 is the product.

$7 \times 8 = 56$ $\quad$ $8 \times 7 = 56$
$6 \times 8 = 48$ $\quad$ $8 \times 6 = 48$
$5 \times 9 = 45$ $\quad$ $9 \times 5 = 45$

In multiplication, the order of the factors does not change the product.

600
600

1800
1800

9
9

**B**

Donald, Bob, and Tim have 2 bowls of fish each. There are 5 fish in each bowl. How many fish are there in all?

$3 \times 2 \times 5 = \square$

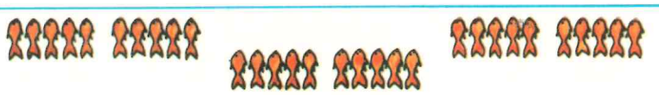
40
40

2400
2400

300
300

**C**

Here is one way to find the number of fish:



$3 \times (2 \times 5) = \square$
$3 \times \quad 10 \quad = \square$

Each boy has 2 bowls of 5 fish. $(2 \times 5)$ fish $= 10$ fish.
There are 3 boys with 10 fish each. $3 \times 10$ fish $= 30$ fish.
The boys have 30 fish in all.

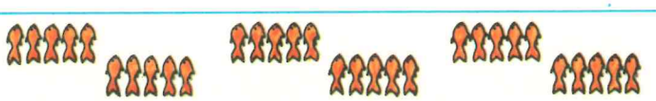
4000
4000

50
50

320
320

**D**

Here is another way to find the number of fish:



$(3 \times 2) \times 5 = \square$
$6 \quad \times 5 = \square$

3 boys have 2 bowls each. $(3 \times 2)$ bowls $= 6$ bowls.
There are 6 bowls with 5 fish in each. $6 \times 5$ fish $= 30$ fish.
The boys have 30 fish in all.

180
180

900
900

210
210

**E**

In Panels C and D, the factors were grouped in different ways. The way we regrouped the factors did not change the product.

Did you notice that we multiplied the numerals in **parentheses ( )** first? When you see an equation with numerals in parentheses, you should multiply those numerals first.

# TENS, HUNDREDS, AND THOUSANDS

This page is for study only.

8
7

9
6

36
9

**A**

When you learned how to add, you learned many things about ONES, TENS, HUNDREDS, and THOUSANDS.

10 ONES = 1 TEN 1 1 1 1 1 1 1 1 1 1 = 10 = 10 × 1

10 TENS = 1 HUNDRED 10 10 10 10 10 10 10 10 10 10 = 100 = 10 × 10

10 HUNDREDS = 1 THOUSAND 100 100 100 100 100 100 100 100 100 100 = 1000 = 10 × 100

63
63

8
49

9
8

**B**

Examine these carefully

| | | | |
|---|---|---|---|
| 10 = 1 TEN = 1 × 10 | 60 = 6 × 10 | 100 = 1 HUNDRED = 1 × 100 | 600 = 6 × 100 |
| 20 = 2 TENS = 2 × 10 | 70 = 7 × 10 | 200 = 2 HUNDREDS = 2 × 100 | 700 = 7 × 100 |
| 30 = 3 TENS = 3 × 10 | 80 = 8 × 10 | 300 = 3 HUNDREDS = 3 × 100 | 800 = 8 × 100 |
| 40 = 4 TENS = 4 × 10 | 90 = 9 × 10 | 400 = 4 HUNDREDS = 4 × 100 | 900 = 9 × 100 |
| 50 = 5 TENS = 5 × 10 | 100 = 10 × 10 | 500 = 5 HUNDREDS = 5 × 100 | 1000 = 10 × 100 |

42
42

6
8

54
54

**C**

Multiplying and dividing TENS, HUNDREDS, and THOUSANDS is like multiplying and dividing ONES.

**6 × 2 TENS = 6 × 20 = 120**
**6 × 2 HUNDREDS = 6 × 200 = 1200**
**6 × 2 THOUSANDS = 6 × 2000 = 12000**

**12 TENS ÷ 6 = 120 ÷ 6 = 20**
**12 HUNDREDS ÷ 6 = 1200 ÷ 6 = 200**
**12 THOUSANDS ÷ 6 = 12000 ÷ 6 = 2000**

64
81

9
7

48
48

**D**

**90 × 7**
**Method 1**

The **order** of the factors does not change the product.

**Think:** 90 × 7 = 7 × 90 = 7 × 9 TENS
7 × 9 TENS = 63 TENS = 630
90 × 7 = 630

6
7

56
56

7
6

**E**

**90 × 7**
**Method 2**

**Regrouping** the factors does not change the product.

**Think:** 90 = 9 × 10, so 90 × 7 = (9 × 10) × 7
(9 × 10) × 7 = (9 × 7) × 10 = 63 × 10 = 630
90 × 7 = 630

| | | |
|---|---|---|
| $7 \times 50 = \square$<br>$\square \div 50 = 7$<br>$50 \times 7 = \square$<br>$\square \div 7 = 50$ | $\square \times 900 = 2700$<br>$2700 \div 900 = \square$<br>$900 \times \square = 2700$<br>$2700 \div \square = 900$ | $8 \times \square = 160$<br>$160 \div \square = 8$<br>$\square \times 8 = 160$<br>$160 \div 8 = \square$ |
| $5 \times \square = 3000$<br>$3000 \div \square = 5$<br>$\square \times 5 = 3000$<br>$3000 \div 5 = \square$ | $3 \times 600 = \square$<br>$\square \div 600 = 3$<br>$600 \times 3 = \square$<br>$\square \div 3 = 600$ | $\square \times 500 = 4500$<br>$4500 \div 500 = \square$<br>$500 \times \square = 4500$<br>$4500 \div \square = 500$ |
| $7 \times \square = 280$<br>$280 \div \square = 7$<br>$\square \times 7 = 280$<br>$280 \div 7 = \square$ | $6 \times 400 = \square$<br>$\square \div 400 = 6$<br>$400 \times 6 = \square$<br>$\square \div 6 = 400$ | $8 \times \square = 2400$<br>$2400 \div \square = 8$<br>$\square \times 8 = 2400$<br>$2400 \div 8 = \square$ |
| $5 \times 800 = \square$<br>$\square \div 800 = 5$<br>$800 \times 5 = \square$<br>$\square \div 5 = 800$ | $3 \times \square = 150$<br>$150 \div \square = 3$<br>$\square \times 3 = 150$<br>$150 \div 3 = \square$ | $4 \times 80 = \square$<br>$\square \div 80 = 4$<br>$80 \times 4 = \square$<br>$\square \div 4 = 80$ |
| $9 \times 20 = \square$<br>$\square \div 20 = 9$<br>$20 \times 9 = \square$<br>$\square \div 9 = 20$ | $4 \times \square = 3600$<br>$3600 \div \square = 4$<br>$\square \times 4 = 3600$<br>$3600 \div 4 = \square$ | $7 \times 30 = \square$<br>$\square \div 30 = 7$<br>$30 \times 7 = \square$<br>$\square \div 7 = 30$ |

**DIRECTIONS:** 1 — Study the examples on this page. The red numerals in the windows are the right answers.

2 — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows where the arrows point.

(Both examples in each pair have the same answer, so you need only write it once.)

3 — To check your work, put your paper or Magic Slate under page 14. See if your answers are the same as the red numerals in the windows.

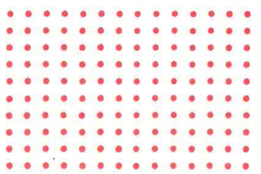
# RELATED MULTIPLICATION AND DIVISION OF ONES, TENS, AND HUNDREDS

**A**

Dividing by TENS

140 ÷ 10 means how many TENS in 140 (14 TENS)?

**140 ÷ 10 = 14**



120 ÷ 40 means how many sets of 4 TENS in 120 (12 TENS)?

**120 ÷ 40 = 3**

**B**

**C**

Dividing by HUNDREDS

1100 ÷ 100 means how many HUNDREDS in 1100?

100 100 100 100 100 100 100 100 100 100 100

1600 ÷ 400 means how many sets of 400 in 1600?

100 100 100 100 | 100 100 100 100 | 100 100 100 100 | 100 100 100 100

**D**

When you know one equation in a number family, you can figure out the other equations.

$5 \times 200 = 1000$ $200 \times 5 = 1000$

$1000 \div 200 = 5$ $1000 \div 5 = 200$

**E**

Study these number families

(a)

$3 \times 10 = 30$ $10 \times 3 = 30$

$30 \div 10 = 3$ $30 \div 3 = 10$

(b)

$2 \times 70 = 140$ $70 \times 2 = 140$

$140 \div 70 = 2$ $140 \div 2 = 70$

(c)

$5 \times 40 = 200$ $40 \times 5 = 200$

$200 \div 40 = 5$ $200 \div 5 = 40$

**F**

(d)

$6 \times 100 = 600$ $100 \times 6 = 600$

$600 \div 100 = 6$ $600 \div 6 = 100$

(e)

$2 \times 700 = 1400$ $700 \times 2 = 1400$

$1400 \div 700 = 2$ $1400 \div 2 = 700$

(f)

$4 \times 200 = 800$ $200 \times 4 = 800$

$800 \div 200 = 4$ $800 \div 4 = 200$

# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 2-9; CARRYING

This page is for study only. Study the panels below as you look at the examples on page 19.

**A**

| HUNDREDS | TENS | ONES |
|---|---|---|
| | 2 | |
| 6 | 8 | 4 |
| | × | 6 |
| | | 4 |

Multiply the ONES: $6 \times 4 = 24$ 24 ONES = 2 TENS + 4 ONES.
Write 4 in ONES place. Put the 2 TENS with the 8 TENS.
We call this **carrying** the TENS.
(NOTE: **Remember** the numbers you carry.
You cannot write them in this book.)

**B**

| HUNDREDS | TENS | ONES |
|---|---|---|
| 5 | 2 | |
| 6 | 8 | 4 |
| | × | 6 |
| 0 | 4 | |

Multiply the TENS: $6 \times 8 = 48$
Add the 2 TENS you carried: $48 + 2 = 50$
50 TENS = 5 HUNDREDS + 0 TENS.
Write 0 in TENS place.
Carry the 5 HUNDREDS.

**C**

| THOUSANDS | HUNDREDS | TENS | ONES |
|---|---|---|---|
| | 5 | 2 | |
| | 6 | 8 | 4 |
| | | × | 6 |
| 4 | 1 | 0 | 4 |

Multiply the HUNDREDS: $6 \times 6 = 36$
Add the 5 HUNDREDS you carried: $36 + 5 = 41$
41 HUNDREDS = 4 THOUSANDS + 1 HUNDRED.
Write 4 in THOUSANDS place and 1 in HUNDREDS place.
The product: Four thousand, one hundred four.

**D**

**$40 \times 9$**

Method 1: $40 \times 9 = 9 \times 40 = 360$

Method 2: $40 \times 9 = (4 \times 10) \times 9$
$(4 \times 10) \times 9 = (4 \times 9) \times 10 = 36 \times 10 = 360$

**E**

**$300 \times 3$**

Method 1: $300 \times 3 = 3 \times 300 = 900$

Method 2: $300 \times 3 = (3 \times 100) \times 3$
$(3 \times 100) \times 3 = (3 \times 3) \times 100 = 9 \times 100 = 900$

**F**

Study these equations

$8 \times 3 = 24$ $6 \times 2 = 12$
$3 \times 8 = 24$ $2 \times 6 = 12$

$80 \times 3 = 240$ $800 \times 3 = 2400$ $60 \times 2 = 120$ $600 \times 2 = 1200$
$30 \times 8 = 240$ $300 \times 8 = 2400$ $20 \times 6 = 120$ $200 \times 6 = 1200$

**DIRECTIONS:** 1 — Study the examples on this page. The red numerals in the windows are the right answers.

2 — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers through the windows straight under the examples. For the examples below the windows, write your answers where the arrows point.

3 — To check your work, put your paper or Magic Slate under page 21. See if your answers are the same as the red numerals in the windows.

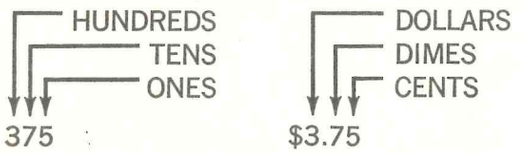
| | | |
|---|---|---|
| 84 × 8<br>9×6=▦<br>6×9=▦ | 759 × 7<br>90×6=▦<br>60×9=▦ | 67 × 8<br>900×6=▦<br>600×9=▦ |
| 52 × 6<br>7×8=▦<br>8×7=▦ | 295 × 5<br>70×8=▦<br>80×7=▦ | 578 × 2<br>700×8=▦<br>800×7=▦ |
| 739 × 7<br>9×8=▦<br>8×9=▦ | 796 × 6<br>90×8=▦<br>80×9=▦ | 97 × 9<br>900×8=▦<br>800×9=▦ |
| 889 × 8<br>6×7=▦<br>7×6=▦ | 958 × 9<br>60×7=▦<br>70×6=▦ | 479 × 4<br>600×7=▦<br>700×6=▦ |
| 374 × 3<br>8×6=▦<br>6×8=▦ | 29 × 7<br>80×6=▦<br>60×8=▦ | 793 × 9<br>800×6=▦<br>600×8=▦ |

# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 2-9; CARRYING DOLLARS AND CENTS

This page is for study only. Study the panels below as you look at the examples on page 21.

**A**

Working with money is like working with ONES, TENS, and HUNDREDS.




10 CENTS = 1 DIME
10 DIMES = 1 DOLLAR
**$** is the **dollar sign.** **¢** is the **cent sign.**
**.** is the **decimal point.** It separates DOLLARS from CENTS.

7404 140 | 47586 1400 | 9388 24000

**B**

9 children each collected $3.75 for the Red Cross. How much did they collect altogether?

| DOLLARS | DIMES | CENTS |
|---|---|---|
| | 4 | |
| $3 | .7 | 5 |
| | × | 9 |
| | | 5 |

Multiply the CENTS: 9 × 5 = 45
45 CENTS = 4 DIMES + 5 CENTS.
Write 5 in CENTS place and carry 4 DIMES.

71712 270 | 79008 2700 | 12618 27000

**C**

| DOLLARS | DIMES | CENTS |
|---|---|---|
| 6 | 4 | |
| $ 3 | .7 | 5 |
| | × | 9 |
| $33 | .7 | 5 |

Multiply the DIMES: 9 × 7 = 63
Add the DIMES you carried: 63 + 4 = 67
67 DIMES = 6 DOLLARS + 7 DIMES.
Write 7 in DIMES place. Carry 6 DOLLARS.
Multiply the DOLLARS: 9 × 3 = 27 27 + 6 = 33
Write 33 in DOLLARS place. Put in the $ and .

9135 320 | 40734 3200 | 70368 32000

**D**

| DOLLARS | DIMES | CENTS |
|---|---|---|
| 3 | 4 | |
| $ 4 | .6 | 8 |
| | × | 5 |
| $23 | .4 | 0 |

CENTS: 5 × 8 = 40
Write 0 in CENTS place. Carry 4 DIMES.
DIMES: 5 × 6 = 30 30 + 4 = 34
Write 4 in DIMES place and carry 3 DOLLARS.
DOLLARS: 5 × 4 = 20 20 + 3 = 23
Write 23 in DOLLARS place. Put in the $ and .

67746 160 | 16025 1600 | 62802 16000

**E**

When you multiply ONES by TENS, the product always has a zero in ONES place.

**60 × 9 = 540** **90 × 5 = 450**
**70 × 3 = 210** **40 × 9 = 360**

**F**

When you multiply TENS by TENS, the product always has a zero in ONES place and in TENS place.

**40 × 40 = 1600** **20 × 30 = 600**
**60 × 70 = 4200** **80 × 90 = 7200**

42980 450 | 9304 4500 | 52182 45000

**DIRECTIONS:** 1 — Study the examples on this page. The blue numerals in the windows are the right answers.

2 — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers through the windows straight under the examples. For the examples below the windows, write your answers where the arrows point.

3 — To check your work, put your paper or Magic Slate under page 23. See if your answers are the same as the blue numerals in the windows.

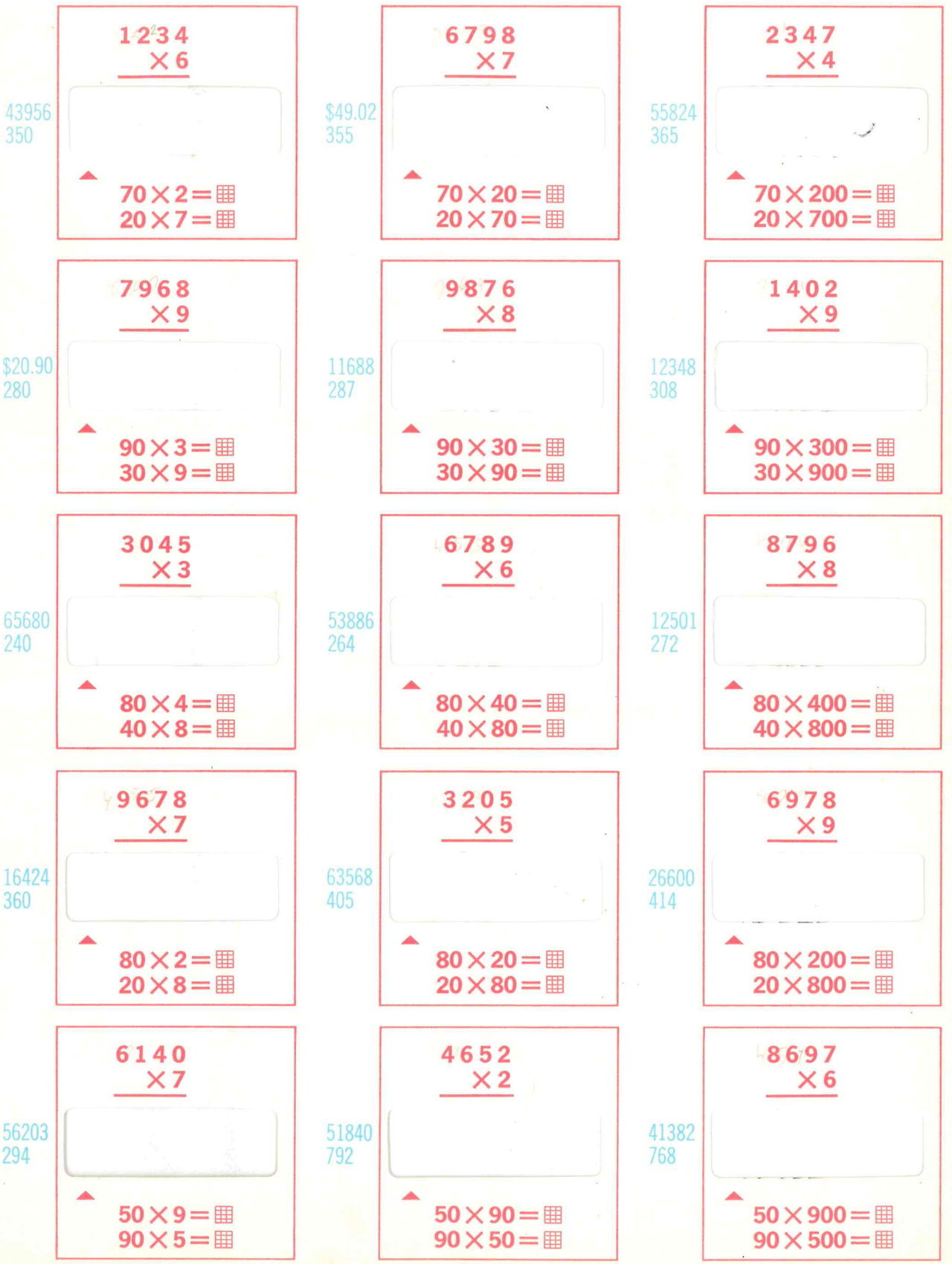
| | | |
|---|---|---|
| $9.87 × 6 → 672 54<br>9×9=▦ | 98 × 8 → 5313 540<br>90×9=▦ | 634 × 5 → 536 5400<br>90×90=▦ |
| 67 × 7 → 312 56<br>8×8=▦ | $5.23 × 4 → 1475 560<br>80×8=▦ | 879 × 9 → 1156 5600<br>80×80=▦ |
| 927 × 8 → 5173 72<br>7×7=▦ | 698 × 9 → 4776 720<br>70×7=▦ | $.46 × 7 → 873 7200<br>70×70=▦ |
| $7.89 × 9 → 7112 42<br>6×6=▦ | 294 × 2 → 8622 420<br>60×6=▦ | 59 × 8 → 1916 4200<br>60×60=▦ |
| 86 × 9 → 1122 48<br>7×9=▦<br>9×7=▦ | $7.89 × 6 → 203 480<br>70×9=▦<br>90×7=▦ | 835 × 3 → 7137 4800<br>70×90=▦<br>90×70=▦ |

**NOTE:** Pay no attention to the red numerals outside the boxes.

**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers.

**2** — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers through the windows straight under the examples. For the examples below the windows, write your answers where the arrows point.

**3** — To check your work, put your paper or Magic Slate under page 20. See if your answers are the same as the red numerals in the windows.






**NOTE:** Pay no attention to the blue numerals outside the boxes.

# 4-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 2-9; CARRYING ZERO IN THE MULTIPLICAND

This page is for study only. Study the panels below as you look at the examples on page 22.

**A**

| 1000s | 100s | 10s | 1s |
|---|---|---|---|
| | 3 | 3 | |
| 8 | 0 | 4 | 5 |
| | | × | 7 |
| | | 1 | 5 |

Multiply the ONES: $7 \times 5 = 35$
Write 5 in ONES place and carry 3 TENS.
Multiply the TENS: $7 \times 4 = 28$
Add the 3 TENS you carried: $28 + 3 = 31$
Write 1 in TENS place. Carry 3 HUNDREDS.

$59.22
81

784
810

3170
8100

**B**

| 10000s | 1000s | 100s | 10s | 1s |
|---|---|---|---|---|
| | | 3 | 3 | |
| | 8 | 0 | 4 | 5 |
| | | | × | 7 |
| 5 | 6 | 3 | 1 | 5 |

Multiply the HUNDREDS: $7 \times 0 = 0$
$0 + 3 = 3$ Write 3 in HUNDREDS place.
Multiply the THOUSANDS: $7 \times 8 = 56$
Write 6 in THOUSANDS place.
Write 5 in TEN THOUSANDS place.

469
64

$20.92
640

7911
6400

**C**

$$\begin{aligned} & 60 \times 4 \\ &= (6 \times 10) \times 4 \\ &= (6 \times 4) \times 10 \\ &= 24 \times 10 \\ &= 240 \end{aligned}$$

A zero is always in ONES place when you multiply ONES by TENS.

**D**

$$\begin{aligned} & 30 \times 50 \\ &= (3 \times 10) \times (5 \times 10) \\ &= (3 \times 5) \times (10 \times 10) \\ &= 15 \times 100 \\ &= 1500 \end{aligned}$$

A zero is always in ONES place and in TENS place when you multiply TENS by TENS.

7416
49

6282
490

$3.22
4900

**E**

$60 \times 600 = (6 \times 10) \times (6 \times 100) = (6 \times 6) \times (10 \times 100) = 36 \times 1000 = 36000$

$20 \times 400 = (2 \times 10) \times (4 \times 100) = (2 \times 4) \times (10 \times 100) = 8 \times 1000 = 8000$

When you multiply HUNDREDS by TENS, there is always a zero in ONES place, in TENS place, and in HUNDREDS place.

$71.01
36

588
360

472
3600

**F**

TENS × ONES = TENS $40 \times 7 = 280$ (4 TENS × 7 ONES = 28 TENS)

TENS × TENS = HUNDREDS $50 \times 70 = 3500$ (5 TENS × 7 TENS = 35 HUNDREDS)

TENS × HUNDREDS = THOUSANDS $60 \times 900 = 54000$ (6 TENS × 9 HUNDREDS = 54 THOUSANDS)

774
63

$47.34
630

2505
6300

**DIRECTIONS:** 1 — Study the examples on this page. The blue numerals in the windows are the right answers.
2 — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers through the windows straight under the examples. For the examples below the windows, write your answers where the arrows point.
3 — To check your work, put your paper or Magic Slate under page 22. See if your answers are the same as the blue numerals in the windows.

| | | |
|---|---|---|
| 7326 × 6<br>5 × 70 = ▦ | $16.34 × 3<br>5 × 71 = ▦ | 6978 × 8<br>5 × 73 = ▦ |
| $10.45 × 2<br>7 × 40 = ▦ | 1948 × 6<br>7 × 41 = ▦ | 1764 × 7<br>7 × 44 = ▦ |
| 8210 × 8<br>8 × 30 = ▦ | 7698 × 7<br>8 × 33 = ▦ | 1389 × 9<br>8 × 34 = ▦ |
| 4106 × 4<br>9 × 40 = ▦ | 7946 × 8<br>9 × 45 = ▦ | 5320 × 5<br>9 × 46 = ▦ |
| 8029 × 7<br>6 × 49 = ▦ | 5760 × 9<br>9 × 88 = ▦ | 6897 × 6<br>8 × 96 = ▦ |

# 4-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 2-9; CARRYING DOLLARS AND CENTS

This page is for study only. Study the panels below as you look at the examples on page 24.

**A**

$$\begin{array}{r} {\scriptstyle 7\ \ \ } \\ 2809 \\ \times\ 8 \\ \hline 72 \end{array}$$

Multiply the ONES: $8 \times 9 = 72$
Write 2 in ONES place. Carry 7 TENS.
Multiply the TENS: $8 \times 0 = 0$
Add the 7 TENS you carried: $0 + 7 = 7$
Write 7 in TENS place.

**B**

$$\begin{array}{r} {\scriptstyle 6\ 7\ \ } \\ 2809 \\ \times\ 8 \\ \hline 22472 \end{array}$$

Multiply the HUNDREDS: $8 \times 8 = 64$
Write 4 in HUNDREDS place. Carry 6 THOUSANDS.
Multiply the THOUSANDS: $8 \times 2 = 16$
$16 + 6 = 22$ Write 2 in THOUSANDS place.
Write 2 in TEN THOUSANDS place.

**C**

Multiply money the way you always multiply. Be sure you put the dollar sign and the decimal point in the product.

$$\begin{array}{r} \$40.95 \\ \times\ 6 \\ \hline \$245.70 \end{array}$$

Remember:
Any number $\times$ 0 = 0
0 $\times$ any number = 0

**D**

You know how to work this example:

$$\begin{aligned} & 5 \times 60 \\ = & \ 5 \times (6 \times 10) \\ = & \ (5 \times 6) \times 10 \\ = & \ 30 \times 10 \\ = & \ 300 \end{aligned}$$

Now let's try $5 \times 68$. It is quite easy. $5 \times 68 = (5 \times 60)$, which you know is 300, $+ (5 \times 8)$:

$$\begin{aligned} & 5 \times 68 \\ = & \ 5 \times (60 + 8) \\ = & \ (5 \times 60) + (5 \times 8) \\ = & \ 300 + 40 \\ = & \ 340 \end{aligned}$$

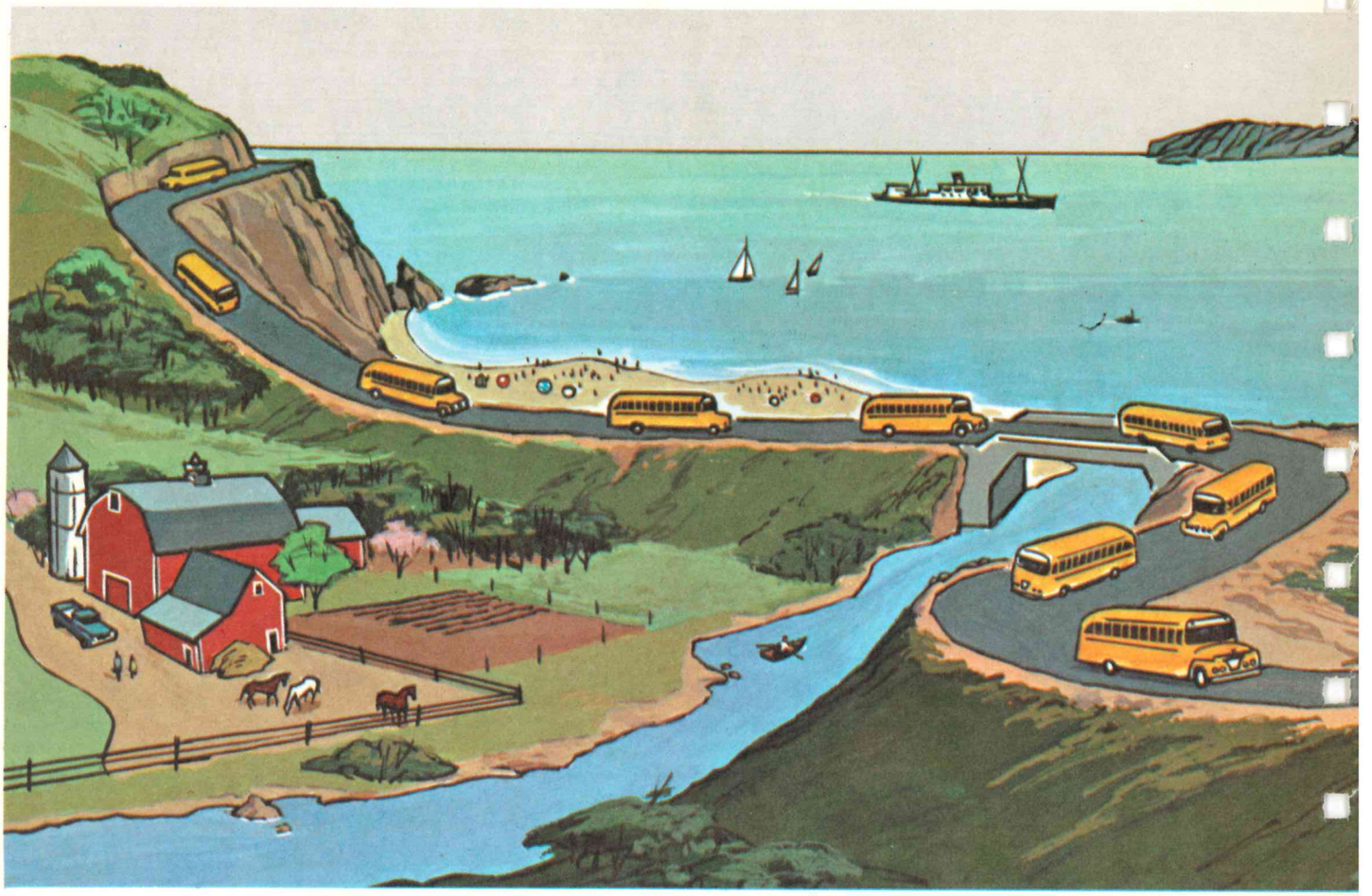
**E**

(a)
$$\begin{aligned} & 7 \times 50 \\ = & \ 7 \times (5 \times 10) \\ = & \ (7 \times 5) \times 10 \\ = & \ 35 \times 10 \\ = & \ 350 \end{aligned}$$

(b)
$$\begin{aligned} & 7 \times 53 \\ = & \ 7 \times (50 + 3) \\ = & \ (7 \times 50) + (7 \times 3) \\ = & \ 350 + 21 \\ = & \ 371 \end{aligned}$$

(c)
$$\begin{aligned} & 7 \times 59 \\ = & \ 7 \times (50 + 9) \\ = & \ (7 \times 50) + (7 \times 9) \\ = & \ 350 + 63 \\ = & \ 413 \end{aligned}$$

# HOW TO MULTIPLY



There are twenty-nine children in each of twelve buses.
How many children are there in all?

$$\begin{array}{r} 29 \\ \times 12 \\ \hline \end{array}$$

There are many ways to find the number of children. Some of these ways are listed below.

$$\begin{array}{r} 20+9 \\ \times 10 \\ \hline 200+90 \end{array} + \begin{array}{r} 20+9 \\ \times 2 \\ \hline 40+18 \end{array} = 348$$

$$12 \times 29 = (10 \times 20) + (10 \times 9) + (2 \times 20) + (2 \times 9)$$
$$= 200 + 90 + 40 + 18 = 348$$

(a)

$$\begin{array}{rr} 29 & 29 \\ \times 10 & \times 2 \\ \hline 90 \leftarrow (10 \times 9) & 18 \leftarrow (2 \times 9) \\ 200 \leftarrow (10 \times 20) & 40 \leftarrow (2 \times 20) \\ \hline 290 & 58 \end{array} \quad 290 + 58 = 348$$

(b)

$$\begin{array}{r} 29 \\ \times 12 \\ \hline 18 \leftarrow (2 \times 9) \\ 40 \leftarrow (2 \times 20) \\ 90 \leftarrow (10 \times 9) \\ 200 \leftarrow (10 \times 20) \\ \hline 348 \end{array}$$

(c)

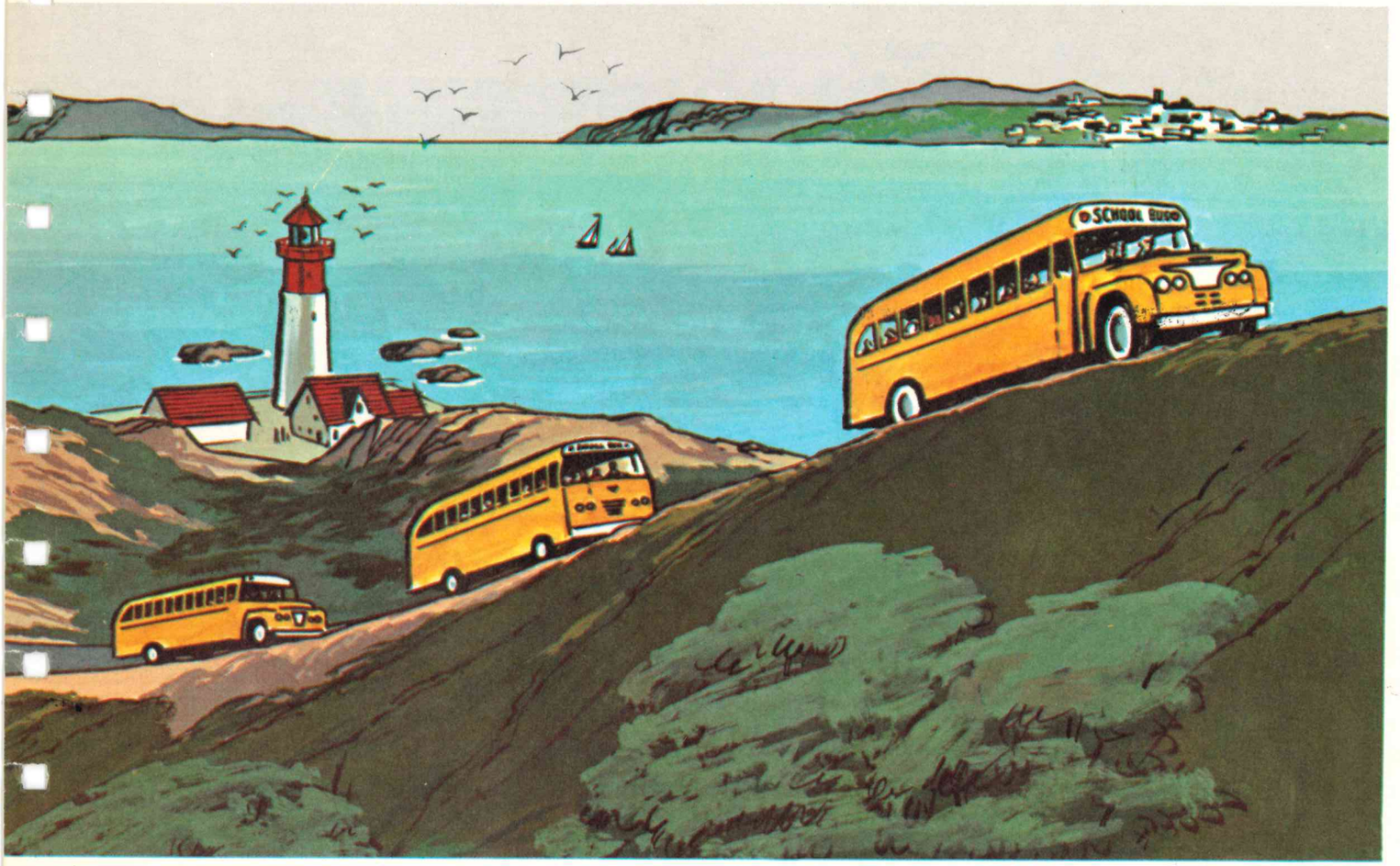
$$\begin{array}{r} 29 \\ \times 12 \\ \hline (2 \times 29) \rightarrow 58 \\ (10 \times 29) \rightarrow 290 \\ \hline 348 \end{array}$$

these are called **partial products**

product

Any way you look at it, there are three hundred forty-eight children in all!

## BY 2-DIGIT MULTIPLIERS




Look at the opposite page. You can easily see that example (c) is the quickest way to find the product. This is how you work example (c):

Step 1

$$\begin{array}{r} {\scriptstyle 1\phantom{0}} \\ 29 \\ \times 12 \\ \hline 58 \end{array}$$

Multiply 29 by 2 the way you always do.
ONES: $2 \times 9 = 18$ Write 8 in ONES place. Carry 1 TEN.
TENS: $2 \times 2 = 4$ Add the 1 TEN you carried: $4 + 1 = 5$
Write 5 in TENS place.
(We call 58 the **first partial product.**)

Step 2

$$\begin{array}{r} 29 \\ \times 12 \\ \hline 58 \\ 290 \end{array}$$

Multiply 29 by 10. ONES: $10 \times 9 = 90$
Write 9 in TENS place and 0 in ONES place. (You don't need to write the 0 in ONES place unless you want to.)
TENS: $10 \times 20 = 200$ Write 2 in HUNDREDS place.
(290 is the **second partial product.**)

Step 3

$$\begin{array}{r} 29 \\ \times 12 \\ \hline 58 \\ 290 \\ \hline 348 \end{array}$$

Add the two partial products: $58 + 290 = 348$
There are 348 children in all.

This page is for study only.

# 2-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 15-19

This page is for study only. Study the panels below as you look at the examples on page 29.

**A**

```
  3
 78
×14
312
```

Step 1

Multiply 78 by 4:
$4 \times 8 = 32$ Write 2 in ONES place and carry 3 TENS.
$4 \times 7 = 28$ Add the 3 TENS you carried: $28 + 3 = 31$
Write 312 as the first partial product.

**B**

```
 78
×14
312
780
```

Step 2

Multiply 78 by 10:
$10 \times 8 = 80$ Write 8 in TENS place
(and write 0 in ONES place, if you want to).
$10 \times 70 = 700$ Write 7 in HUNDREDS place.
780 is the second partial product.

**C**

```
 78
×14
312
780
1092
```

Step 3

Add the two partial products:
$312 + 780 = 1092$
The total product is 1092.

**D**

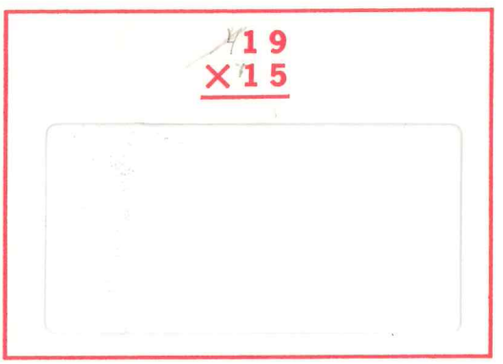
A fast way to multiply by 10

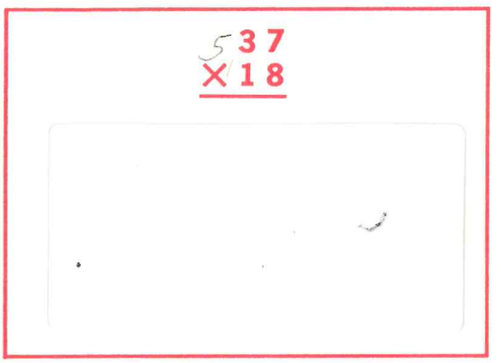
**Multiply by 1. Then put a zero at the end.**

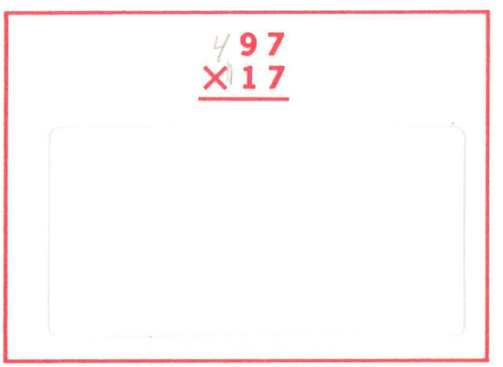
**$10 \times 39 = 390$** (390 is $1 \times 39$, but with a zero at the end.)

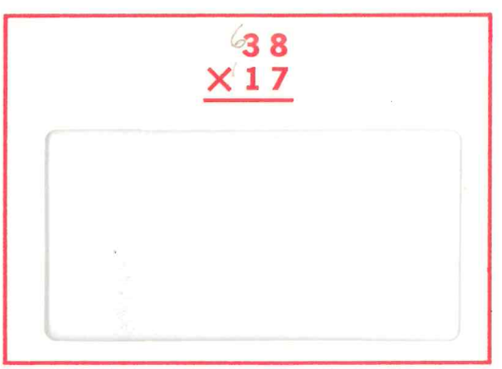
**$10 \times 26 = 260$** **$10 \times 73 = 730$** **$10 \times 99 = 990$**

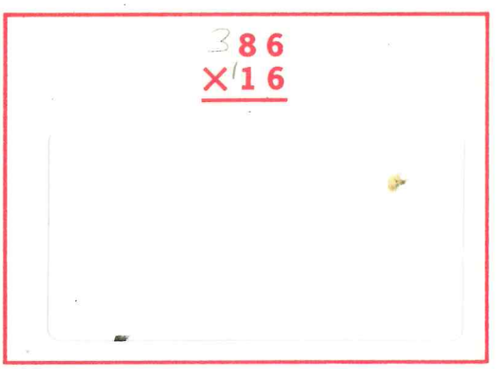
**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 31. See if your answers are the same as the red numerals in the windows (check to see if your work is the same, too).

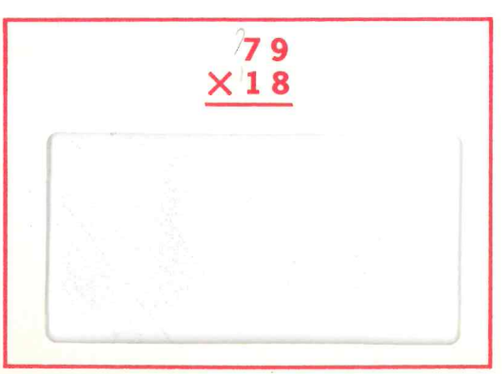


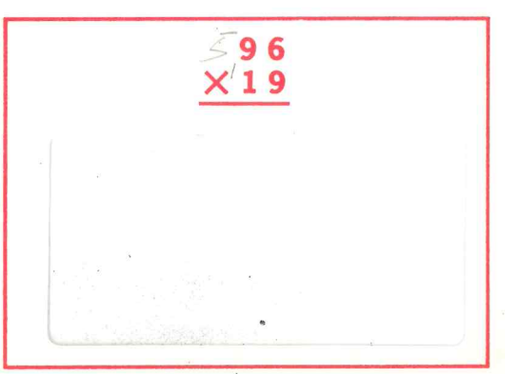





# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 15-19

This page is for study only. Study the panels below as you look at the examples on page 31.

**A**

Mr. Brown delivered 642 letters on each of 17 days one month. How many letters did he deliver in those 17 days?

$$\begin{array}{r} 642 \\ \times 17 \\ \hline \end{array}$$

$$\begin{array}{r} 144 \\ 4320 \\ \hline 4464 \end{array} \qquad \begin{array}{r} 304 \\ 1140 \\ \hline 1444 \end{array}$$

**B**

$$\begin{array}{r} 642 \\ \times 17 \\ \hline 4494 \end{array}$$

Step 1

Multiply $7 \times 642$ the way you always do.

Write 4494 as the first partial product.

$$\begin{array}{r} 316 \\ 7110 \\ \hline 7426 \end{array} \qquad \begin{array}{r} 325 \\ 4550 \\ \hline 4875 \end{array}$$

**C**

$$\begin{array}{r} 642 \\ \times 17 \\ \hline 4494 \\ 6420 \\ \hline 10914 \end{array}$$

Step 2

Multiply 642 by 10: $10 \times 642 = 6420$
Write the 2 under the 1 TEN.
Add the partial products.
Mr. Brown delivered 10914 letters.

$$\begin{array}{r} 108 \\ 1350 \\ \hline 1458 \end{array} \qquad \begin{array}{r} 162 \\ 1080 \\ \hline 1242 \end{array}$$

**D**

$$\begin{array}{r} 243 \\ \times 18 \\ \hline 1944 \\ 2430 \\ \hline 4374 \end{array}$$

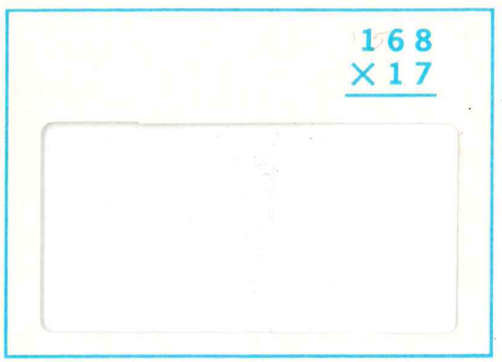
1944 first partial product
2430 second partial product
4374 total product

(1) Multiply: $8 \times 243 = 1944$
(2) Multiply: $10 \times 243 = 2430$
(No need to write the 0 unless you want to. If you don't write the 0, be sure you put the 3 under the 1.)
(3) Add the partial products.

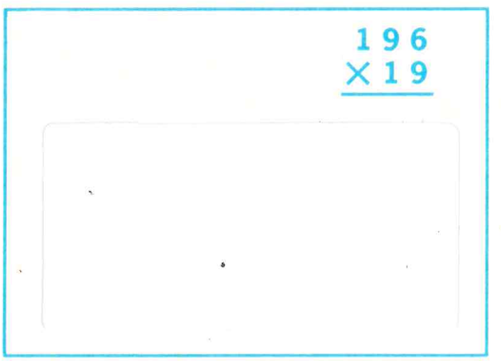
$$\begin{array}{r} 774 \\ 1720 \\ \hline 2494 \end{array} \qquad \begin{array}{r} 195 \\ 2600 \\ \hline 2795 \end{array}$$

 DO NOT write through the windows on this page.

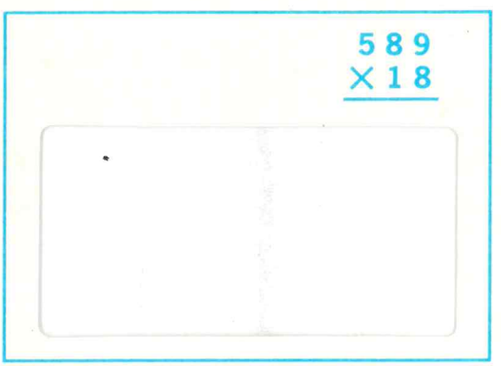
**DIRECTIONS: 1** — Study the examples on this page. The blue numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 33. See if your answers are the same as the blue numerals in the windows (check to see if your work is the same, too).




95
190
285



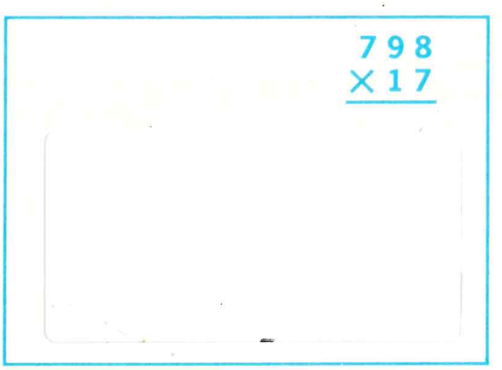

296
370
666



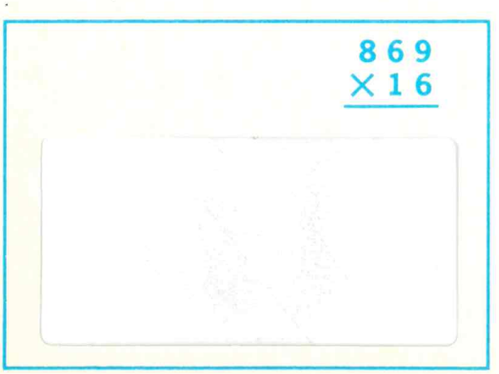

783
870
1653

679
970
1649

266
380
646




516
860
1376

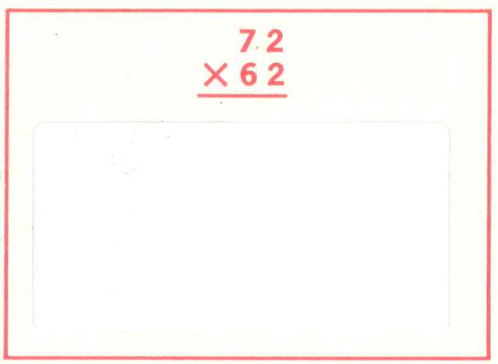


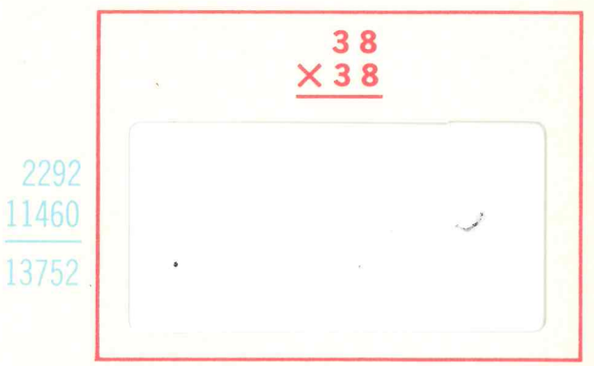

632
790
1422

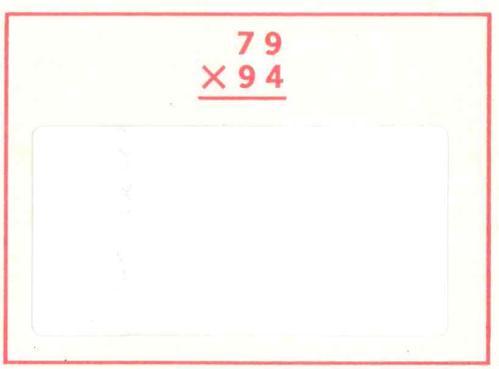
864
960
1824

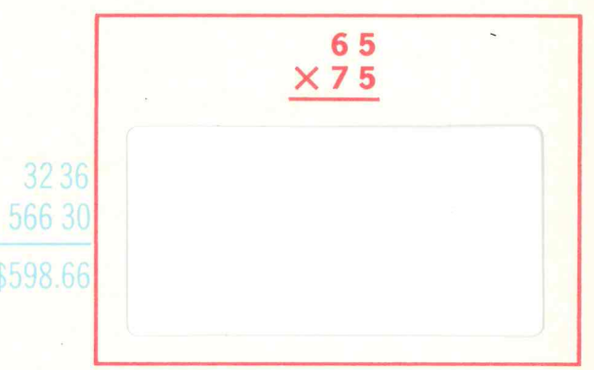
**NOTE:** Pay no attention to the red numerals outside the boxes.

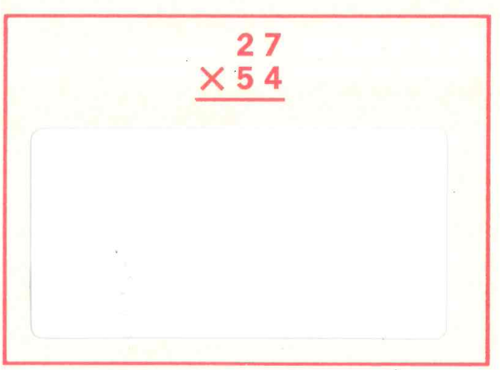
**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 30. See if your answers are the same as the red numerals in the windows (check to see if your work is the same, too).

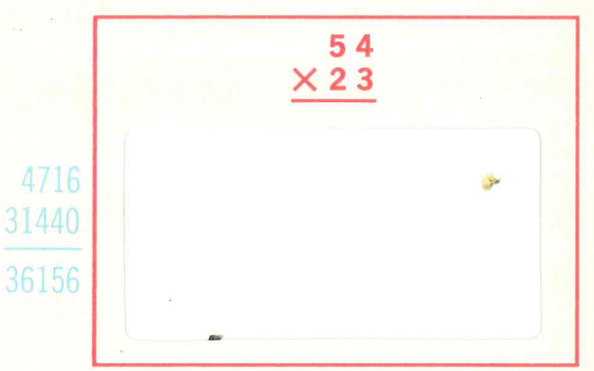


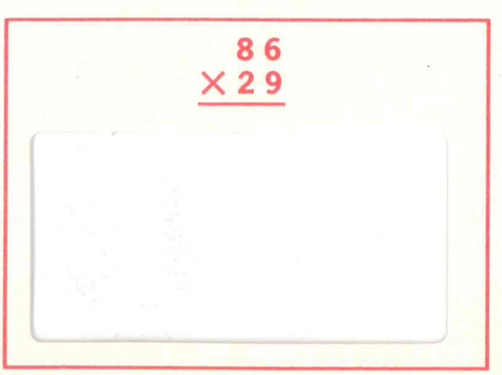



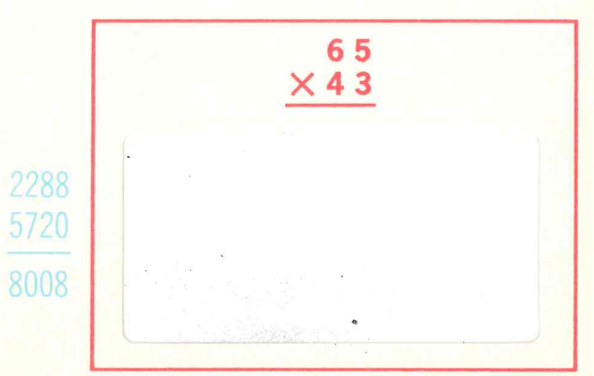






**NOTE:** Pay no attention to the blue numerals outside the boxes.

# 2-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 21-99

This page is for study only. Study the panels below as you look at the examples on page 32.

**A**

You know the importance of the place value of digits in numerals. Now let's study fast ways to multiply, putting digits where they belong because of their place value.

$$\begin{array}{r} {\scriptstyle 2\ \ } \\ 64 \\ \times 37 \\ \hline 448 = 400 + 40 + 8 \end{array}$$

Step 1

Multiply 64 by 7: $7 \times 4 = 28$ Write 8 in ONES place; carry 2 TENS.
$7 \times 6$ TENS $= 42$ TENS $\quad 42$ TENS $+ 2$ TENS $= 44$ TENS
Write 4 in TENS place and 4 in HUNDREDS place.

| | |
|---|---|
| 1176<br>1680<br>2856 | 1764<br>1960<br>3724 |

**B**

$$\begin{array}{r} {\scriptstyle 1\ \ } \\ 64 \\ \times 37 \\ \hline 448 \\ 1920 \\ \hline 2368 \end{array}$$

Step 2

Multiply 64 by 30: $30 \times 4 = 120$ (1 HUNDRED; 2 TENS)
Write 2 in TENS place (under the 3). Carry 1 HUNDRED.
$30 \times 6$ TENS $= 180$ TENS (1800) Add 1 HUNDRED.
Write 9 in HUNDREDS place and 1 in THOUSANDS place.
Add the partial products: $448 + 1920 = 2368$

| | |
|---|---|
| 4712<br>5890<br>10602 | 4122<br>6870<br>10992 |

**C**

$$\begin{array}{r} {\scriptstyle 2\ \ } \\ 64 \\ \times 37 \\ \hline 448 \end{array}$$

Now let's go through these steps again, but more quickly:

Step 1

$7 \times 4 = 28$ Write 8; carry 2.
$7 \times 6 = 42$ $42 + 2 = 44$ Write 44.

| | |
|---|---|
| 7542<br>8380<br>15922 | 5586<br>7980<br>13566 |

**D**

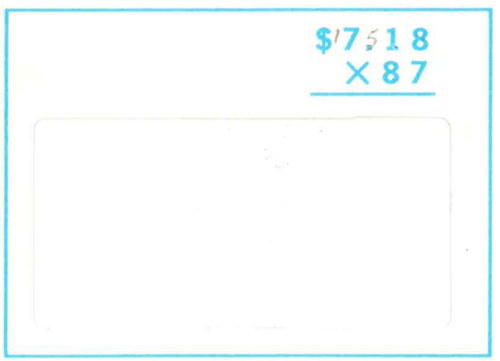
$$\begin{array}{r} {\scriptstyle 1\ \ } \\ 64 \\ \times 37 \\ \hline 448 \\ 1920 \\ \hline 2368 \end{array}$$

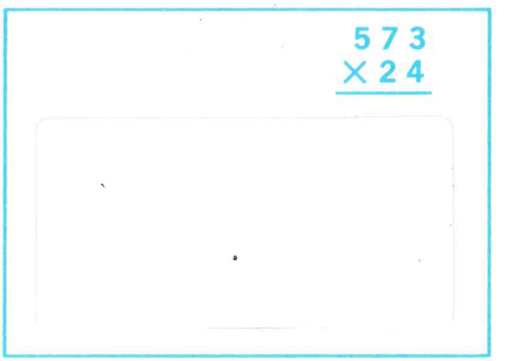
Step 2

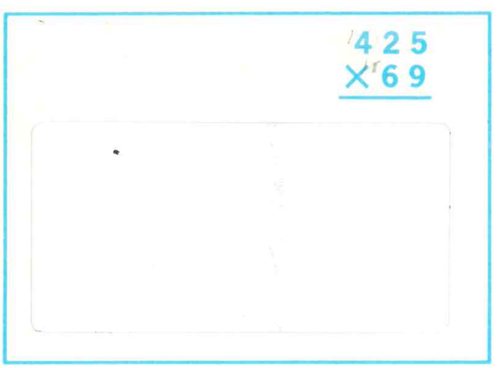
$3 \times 4 = 12$ Write 2 under the 3; carry 1.
$3 \times 6 = 18$ $18 + 1 = 19$ (1900)
Write 9 in HUNDREDS place and 1 in THOUSANDS place.
Add the partial products.

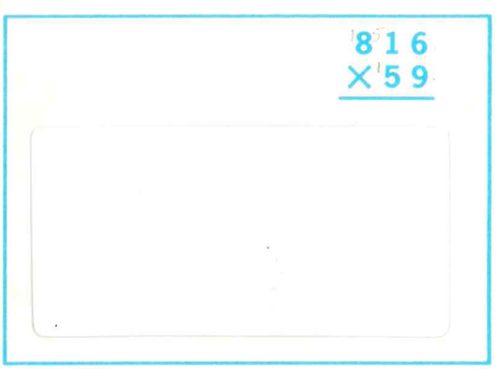
| | |
|---|---|
| 5214<br>8690<br>13904 | 4581<br>5090<br>9671 |

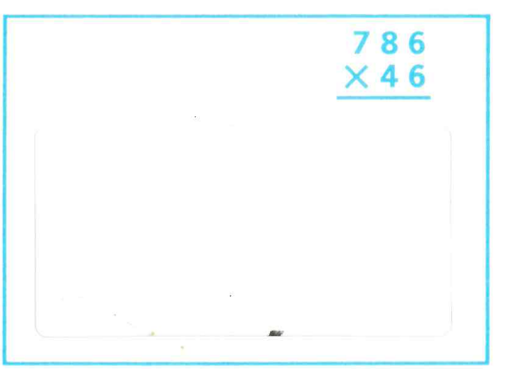
**DIRECTIONS: 1** — Study the examples on this page. The blue numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 32. See if your answers are the same as the blue numerals in the windows (check to see if your work is the same, too).

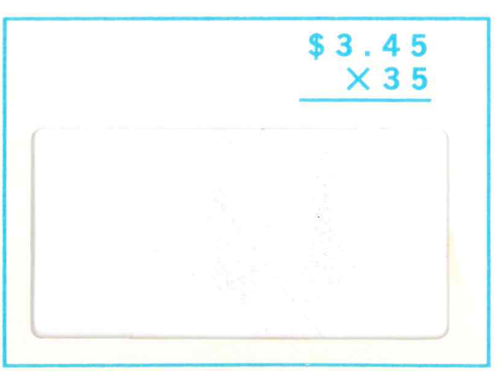


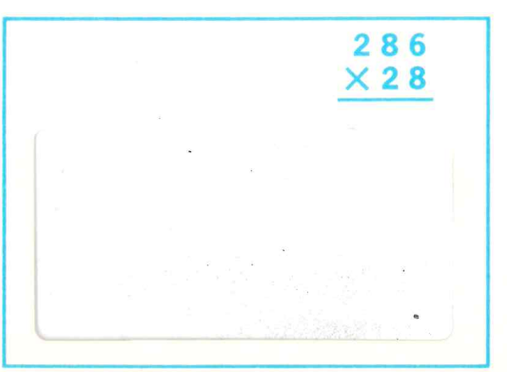





# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 21-99 (1)
## DOLLARS AND CENTS

**A**

Multiply money the way you always multiply. Be sure to put in the dollar sign ($) and the decimal point (.).

Mr. Herman sold 84 Halloween costumes at $2.98 each. How much money did he get in all?

**B**

$$\begin{array}{r} \$2.98 \\ \times 84 \\ \hline 11\ 92 \\ 238\ 40 \end{array}$$

Step 1

Multiply by 4 ONES: $4 \times 298 = 1192$
Write 1192 as the first partial product.
Multiply by 8 TENS: $80 \times 298 = 23840$
Write 23840 as the second partial product.
(Be sure to write the 4 under the 8 TENS.)

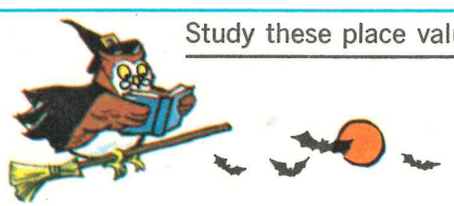
**C**

$$\begin{array}{r} \$2.98 \\ \times 84 \\ \hline 11\ 92 \\ 238\ 40 \\ \hline \$250.32 \end{array}$$

Step 2

Add the two partial products.
$1192 + 23840 = 25032$
This is an example with money; remember to put in the $ and . .

**D**



Study these place values

$$\begin{array}{r} 298 \\ \times 84 \\ \hline 1192 \\ 23840 \\ \hline 25032 \end{array}$$

8 is in ONES place.
8 is in TENS place.
1 is in THOUSANDS place.
8 is in HUNDREDS place.
2 is in TEN THOUSANDS place.

# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 21-99 (2)
# DOLLARS AND CENTS

**A**

28 of the children at the rink have skates that cost $7.98 a pair. How much did the 28 pairs of skates cost?

$7.98
×28

**B**

$7.98
×28
63 84

Step 1

Multiply by 8 ONES: $8 \times 8 = 64$ Write 4; carry 6.
$8 \times 9 = 72$ $72 + 6 = 78$ Write 8; carry 7.
$8 \times 7 = 56$ $56 + 7 = 63$ Write 63.
6384 is the first partial product.

**C**

$7.98
×28
63 84
159 6
$223.44

Step 2

Multiply by 2 TENS: $2 \times 8 = 16$
Write 6 in TENS place; carry 1.
$2 \times 9 = 18$ $18 + 1 = 19$ Write 9; carry 1.
$2 \times 7 = 14$ $14 + 1 = 15$ Write 15. Add the partial products.
Put in the $ and . . The skates cost $223.44.

**D**

Study this numeral

2 2 3 4 4

2 TEN THOUSANDS
2 THOUSANDS
3 HUNDREDS
4 TENS
4 ONES

Twenty-two thousand, three hundred forty-four.

 This page is for study only. Study the panels above as you look at the examples on page 37.

$7.69
×38

24
×41

789
×56

$9.63
×46

67
×87

976
×79

109
×23

$7.98
×98

**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 39. See if your answers are the same as the red numerals in the windows (check to see if your work is the same, too).

## 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 21-99 (3)

2304
3840
768
117504

692
000
173
17992

**A**

**Any number times zero equals zero.**

$6 \times 0 = 0$
$2 \times 0 = 0$

$50 \times 0 = 0$
$92 \times 0 = 0$

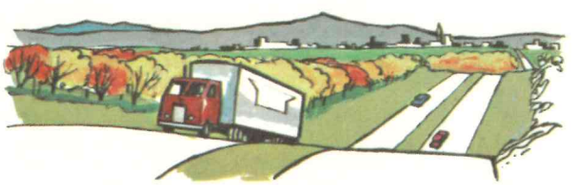
$300 \times 0 = 0$
$745 \times 0 = 0$

369
246
123
15129

1416
1593
177
35046

**B**

Bill's dad drove 406 miles on each of 23 trips. How many miles did he drive altogether?



406
×23

4392
3843
549
97722

1728
2160
432
66528

**C**

406
×23
1218
812
9338

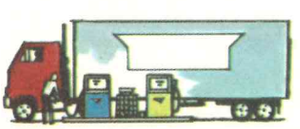
Multiply by ONES: $3 \times 406 = 1218$
Multiply by TENS: $2 \times 406 = 812$
Add the partial products.
Bill's dad drove 9338 miles.

8874
7888
986
186354

630
525
105
16380

**D**

Bill's dad bought 98 gallons of gas at 30¢ a gallon. How much did he pay?



$.30
×98
2 40
27 0
$29.40

ONES: $8 \times 30 = 240$
TENS: $9 \times 30 = 270$
Add the partial products.
Put in the $ and . .
Bill's dad paid $29.40.



This page is for study only. Study the panels above as you look at the examples on page 39. DO NOT write through the windows on this page.

256
×23

61 52
230 7
$292.22

609
×69

24
96
984

39
×20

4734
3945
44184

908
×73

57 78
385 2
$442.98

768
×67

469
536
5829

140
×82

8784
6832
77104

208
×54

327
218
2507

437
×30

63 84
718 2
$782.04

**DIRECTIONS: 1** — Study the examples on this page. The blue numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 41. See if your answers are the same as the blue numerals in the windows (check to see if your work is the same, too).

**NOTE:** Pay no attention to the red numerals outside the boxes.

$$\begin{array}{r} 768 \\ \times\ 153 \\ \hline \end{array}$$

4608
3072
1536
188928

$$\begin{array}{r} 173 \\ \times\ 104 \\ \hline \end{array}$$

984
738
492
57564

$$\begin{array}{r} 123 \\ \times\ 123 \\ \hline \end{array}$$

1836
2295
2754
300186

$$\begin{array}{r} 177 \\ \times\ 198 \\ \hline \end{array}$$

4669
5336
6003
658329

$$\begin{array}{r} 549 \\ \times\ 178 \\ \hline \end{array}$$

7888
6902
7888
865708

$$\begin{array}{r} 432 \\ \times\ 154 \\ \hline \end{array}$$

000
8505
2835
368550

$$\begin{array}{r} 986 \\ \times\ 189 \\ \hline \end{array}$$

2079
1617
1155
133749

$$\begin{array}{r} 105 \\ \times\ 156 \\ \hline \end{array}$$

7101
5523
4734
535731

**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers (they also show you how to work the examples). **2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows under the examples. **3** — To check your work, put your paper or Magic Slate under page 38. See if your answers are the same as the red numerals in the windows (check to see if your work is the same, too).

**NOTE:** Pay no attention to the blue numerals outside the boxes.

# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 101-199

768
512
5888

5481
3654
42021

**A**

1 HUNDRED = 1 × 100 = 100
100 ONES = 100 × 1 = 100
10 HUNDREDS = 10 × 100 = 1000
100 HUNDREDS = 100 × 100 = 10000

**B**

An easy way to multiply by 100

**Multiply by 1. Then put 2 zeros at the end.**

**100 × 6 = ▦** Think: 1 × 6 = 6

Now put 2 zeros at the end:

**100 × 6 = 600**

00
78
780

2724
6356
66284

**C**

Now try your skill at multiplying by 100!

**100 × 59 = ▦** Think: 1 × 59 = 59
Put 2 zeros at the end:
**100 × 59 = 5900**

**100 × 643 = ▦** Think: 1 × 643 = 643
Put 2 zeros at the end:
**100 × 643 = 64300**

5376
4608
51456

280
1120
11480

**D**

**289**
**×164**
**1156**
**17340**

Step 1 — 4 × 289 = 1156, the first partial product.

Step 2 — 60 × 289 = 17340, the second partial product. (No need to write the 0, but be sure you write the 4 under the 6.)

832
1040
11232

000
1311
13110

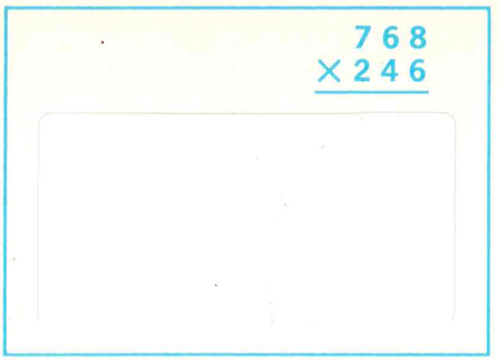
**E**

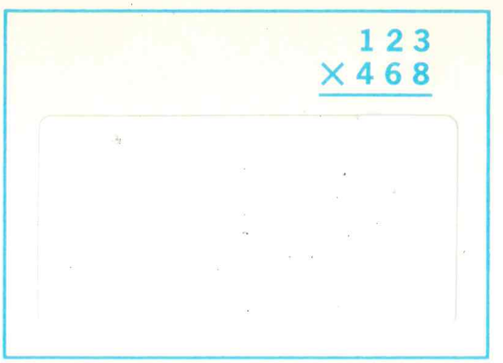
**289**
**×164**
**1156**
**17340**
**28900**
**47396**

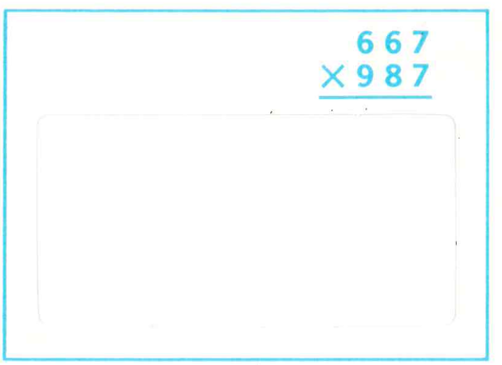
Step 3 — 100 × 289 = 28900, the third partial product. (You don't need to write the zeros, but be sure to write the 9 under the 1.)

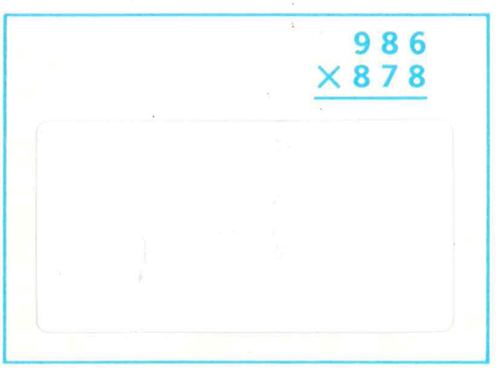
Step 4 — Add the partial products:
1156 + 17340 + 28900 = 47396

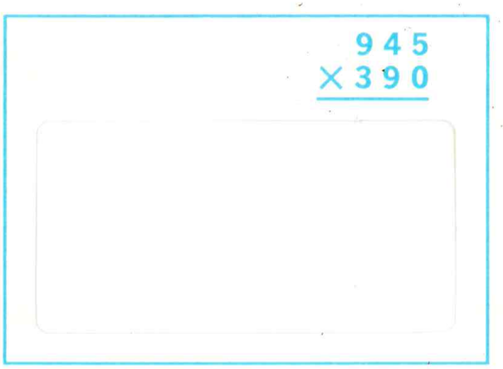
This page is for study only. Study the panels above as you look at the examples on page 40.
DO NOT write through the windows on this page.

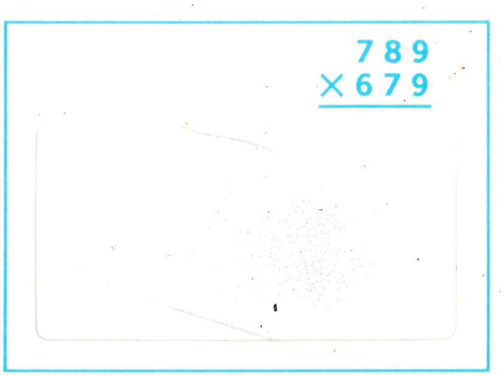




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# 3-DIGIT MULTIPLICANDS WITH MULTIPLIERS OF 201-999

**A**

Study this numeral

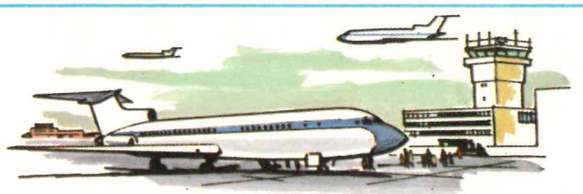
1 6 2 5 0 3 2

1 MILLION
625 THOUSANDS
0 HUNDREDS
3 TENS
2 ONES

One million, six hundred twenty-five thousand, thirty-two.
(1 million = 1000 × 1000)

**B**

264 planes each carried 968 passengers one week. How many passengers were carried in all by these planes?



$$\begin{array}{r} 968 \\ \times 264 \\ \hline \end{array}$$

**C**

$$\begin{array}{r} 968 \\ \times 264 \\ \hline 3872 \\ 5808 \\ 1936 \end{array}$$

ONES: $4 \times 968 = 3872$
TENS: $6 \times 968 = 5808$ (Put the 8 under the 6.)
HUNDREDS: $2 \times 968 = 1936$ (Put the 6 under the 2.)

**D**

$$\begin{array}{r} 968 \\ \times 264 \\ \hline 3872 \\ 5808 \\ 1936 \\ \hline 255552 \end{array}$$

Add the partial products.
The planes carried 255552 passengers.

This page is for study only. Study the panels above as you look at the examples on page 42

# 2-, 3-, AND 4-DIGIT DIVIDENDS WITH DIVISORS OF 6-9 (1) ZERO IN THE DIVIDEND

**A**

Dividing TENS, HUNDREDS, and THOUSANDS is like dividing ONES.

| | |
|---|---|
| 32 ONES ÷ 4 = 8 ONES | 32 ÷ 4 = 8 |
| 32 TENS ÷ 4 = 8 TENS | 320 ÷ 4 = 80 |
| 32 HUNDREDS ÷ 4 = 8 HUNDREDS | 3200 ÷ 4 = 800 |

**B**

Alice washed the same number of dishes every day for a week. If she washed 287 dishes altogether, how many dishes did she wash each day?

$7\overline{)287}$

287 = 2 HUNDREDS, 8 TENS, and 7 ONES.
287 also equals 28 TENS AND 7 ONES.

**C**

| HUNDREDS | TENS | ONES |
|---|---|---|
| | 4 | 1 |
| 7 ) 2 | 8 | 7 |

HUNDREDS: You cannot divide 2 HUNDREDS into 7 equal groups of HUNDREDS, so change the 2 HUNDREDS to 20 TENS.
TENS: $28 \div 7 = 4$ Write 4 in TENS place (over the 8).
ONES: $7 \div 7 = 1$ Write 1 in ONES place.
The quotient (answer) is 41. Alice washed 41 dishes each day.

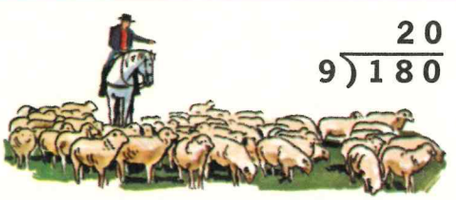
**D**

**0 ÷ any number = 0**

$0 \div 0 = 0$ $0 \div 8 = 0$ $0 \div 34 = 0$ $0 \div 299 = 0$ $0 \div 73 = 0$ $0 \div 5 = 0$

**E**

Mike has 180 sheep.
He wants to divide them into 9 equal groups.
How many sheep should he put in each group?



$9\overline{)180}$ 20

Divide the TENS:
$18 \div 9 = 2$
Divide the ONES:
$0 \div 9 = 0$
There will be 20 sheep in each group.

| | | |
|---|---|---|
| $49 \div 7 = \square$ <br> $6\overline{)546}$ | $490 \div 7 = \square$ <br> $7\overline{)427}$ | $4900 \div 7 = \square$ <br> $8\overline{)560}$ |
| $81 \div 9 = \square$ <br> $9\overline{)540}$ | $810 \div 9 = \square$ <br> $8\overline{)240}$ | $8100 \div 9 = \square$ <br> $6\overline{)486}$ |

**DIRECTIONS: 1** — Study the examples on this page. The red numerals in the windows are the right answers.

**2** — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers where the arrows point. For the examples below the windows, write your answers through the windows straight over the examples.

| | | |
|---|---|---|
| $72 \div 8 = \square$ <br> $9\overline{)810}$ | $720 \div \square = 90$ <br> $7\overline{)560}$ | $7200 \div 8 = \square$ <br> $4\overline{)368}$ |
| $64 \div 8 = \square$ <br> $6\overline{)420}$ | $\square \div 8 = 80$ <br> $9\overline{)729}$ | $6400 \div 8 = \square$ <br> $7\overline{)630}$ |

**3** — To check your work, put your paper or Magic Slate under page 47. See if your answers are the same as the red numerals in the windows.

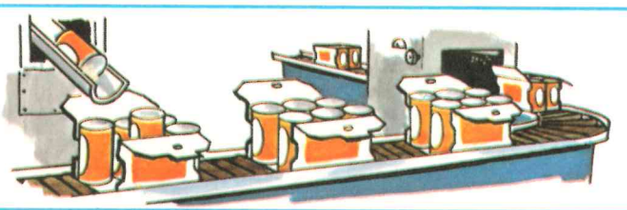
| | | |
|---|---|---|
| $36 \div 6 = \square$ <br> $8\overline{)488}$ | $360 \div 6 = \square$ <br> $9\overline{)189}$ | $\square \div 6 = 600$ <br> $9\overline{)630}$ |

# 2-, 3-, AND 4-DIGIT DIVIDENDS WITH DIVISORS OF 6-9 (2) ZERO IN THE DIVIDEND

6r8 7r6 | 8r1 6r1 | 6r2 9r4

**A**

There are 6 cans of soda in each pack. How many packs can be made from 120 cans of soda?



$6\overline{)120}$

8r2 9r2 | 8r5 9r4 | 7r2 6r5

**B**

$$6\overline{)120}\quad 20$$

HUNDREDS: 1 HUNDRED cannot be divided into 6 equal groups of HUNDREDS, so change the 1 HUNDRED to 10 TENS.
TENS: $12 \div 6 = 2$
Write 2 in TENS place.
ONES: $0 \div 6 = 0$
Write 0 in ONES place.
The quotient is 20.
There will be 20 packs of soda.

6r1 9r7 | 7r7 8r1 | 6r7 7r3

**C**

If 1 bag will hold 4 bars of candy, how many bags will be needed to hold 248 bars of candy?

$$4\overline{)248}\quad 62$$

Change the 2 HUNDREDS to 20 TENS.
Divide the TENS: $24 \div 4 = 6$
Divide the ONES: $8 \div 4 = 2$
62 bags will be needed.

7r2 8r3 | 6r5 8r4 | 8r6 7r4

**D**

$350 \div 70$ means how many 70s are there in 350, or how many groups of 7 TENS in 35 TENS.

**$35 \div 7 = 5$ $35$ TENS $\div 7$ TENS $= 5$ $350 \div 70 = 5$**

**E**

$4500 \div 90$ means how many groups of 9 TENS are there in 450 TENS (45 HUNDREDS).

**$45 \div 9 = 5$ $450 \div 9 = 50$**
**$450$ TENS $\div 9$ TENS $= 50$ $4500 \div 90 = 50$**

**F**

$360 \div 60$ means how many 60s are there in 360, or how many groups of 6 TENS in 36 TENS.

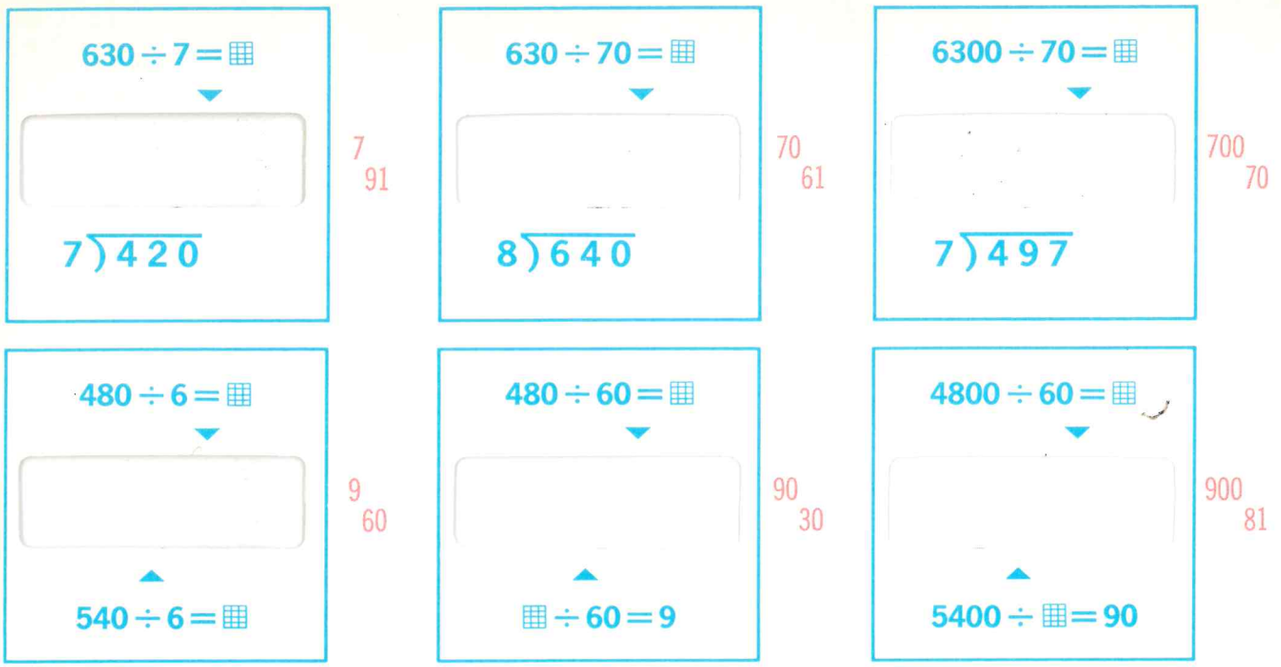
**$36 \div 6 = 6$ $36$ TENS $\div 6$ TENS $= 6$ $360 \div 60 = 6$**

**G**

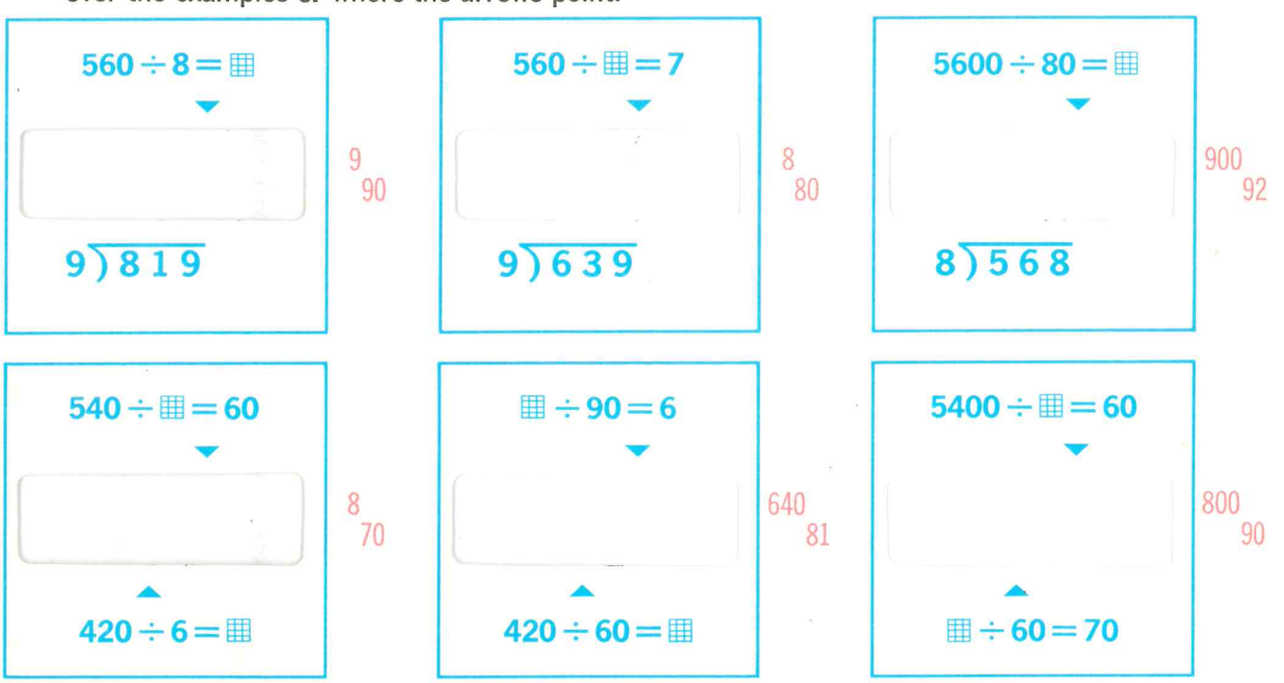
$3200 \div 80$ means how many groups of 80 are there in 3200.

**$32 \div 8 = 4$ $320 \div 8 = 40$**
**$320$ TENS $\div 8$ TENS $= 40$ $3200 \div 80 = 40$**

9r2 9r1 | 8r6 7r3 | 9r6 6r5

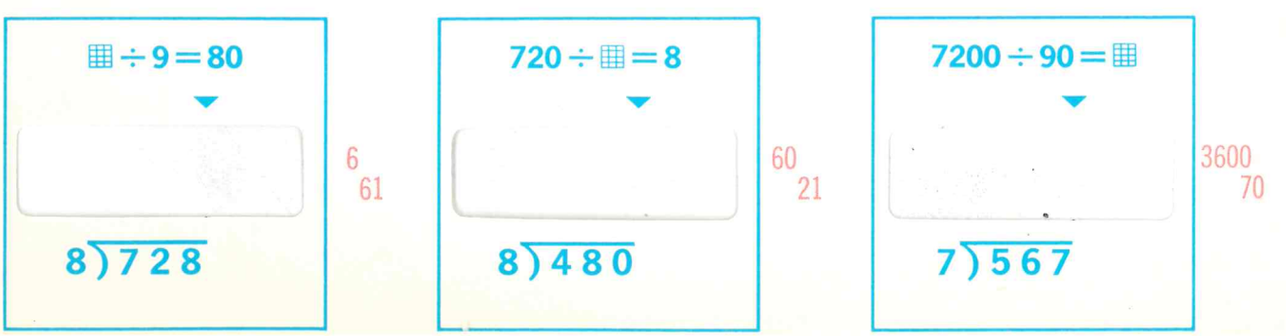


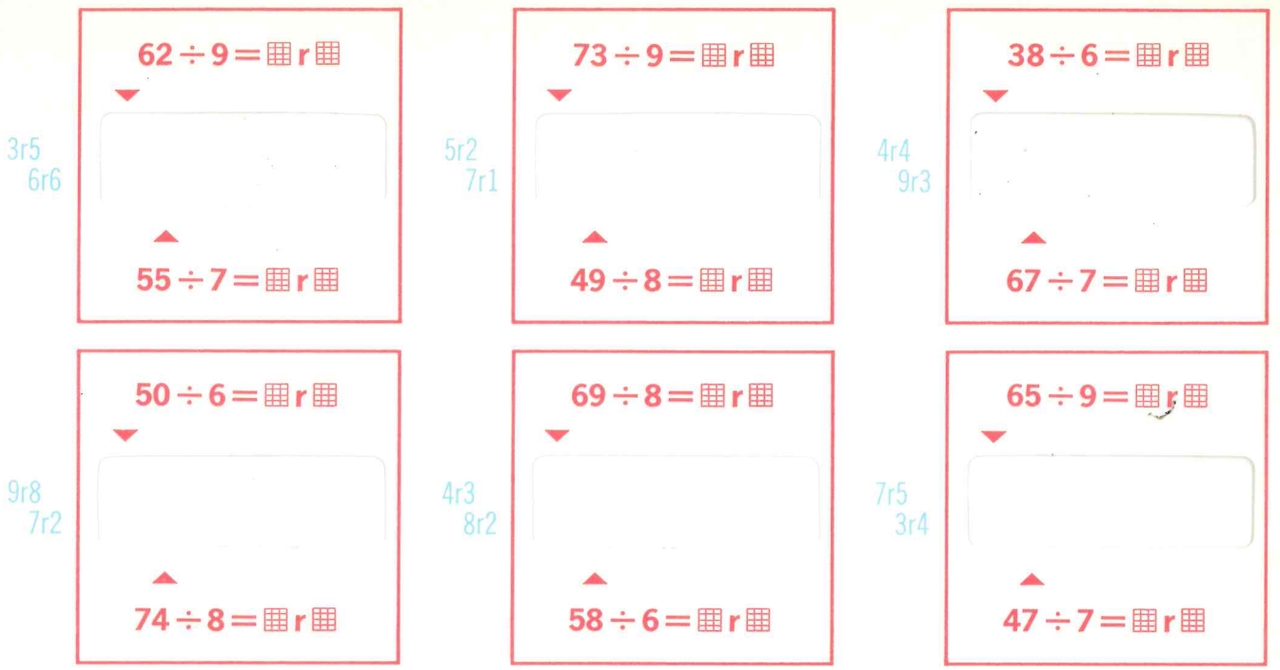

**DIRECTIONS: 1** — Study the examples on this page. The blue numerals in the windows are the right answers. **2** — Put a piece of paper or a Magic Slate under this page. For the examples above the windows, write your answers where the arrows point. For the examples below the windows, write your answers through the windows straight over the examples **or** where the arrows point.




**3** — To check your work, put your paper or Magic Slate under page 49. See if your answers are the same as the blue numerals in the windows.

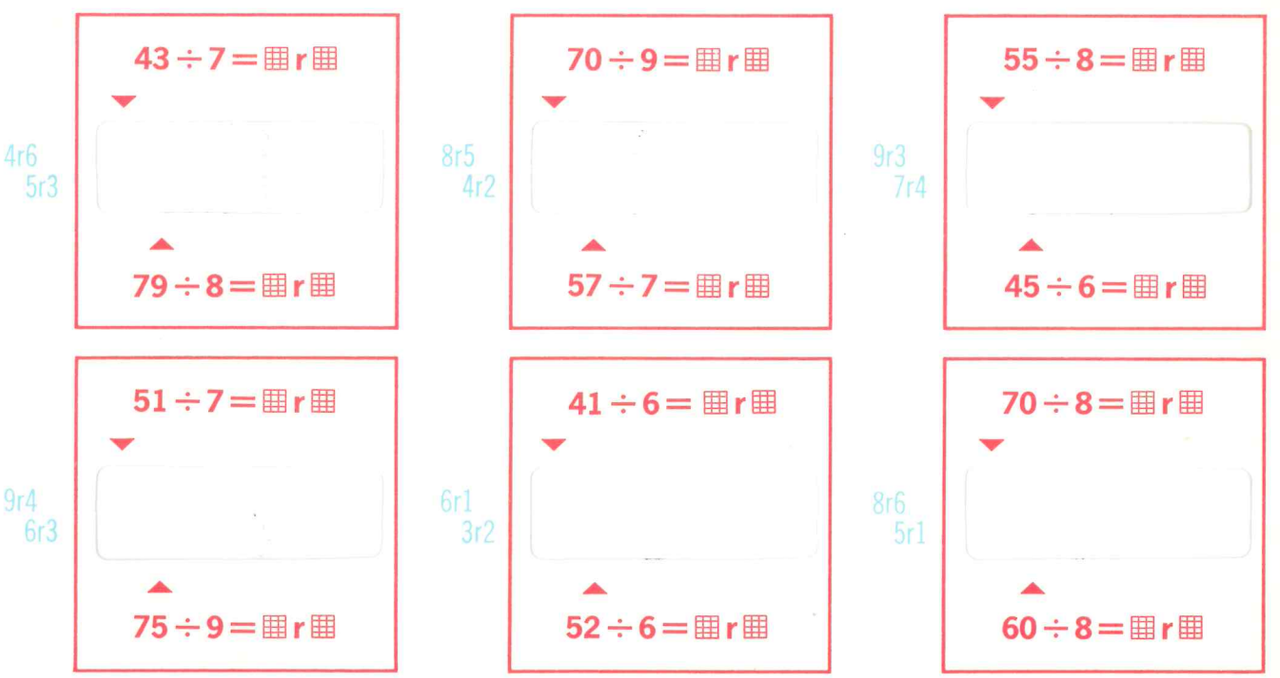
**NOTE:** Pay no attention to the red numerals outside the boxes.





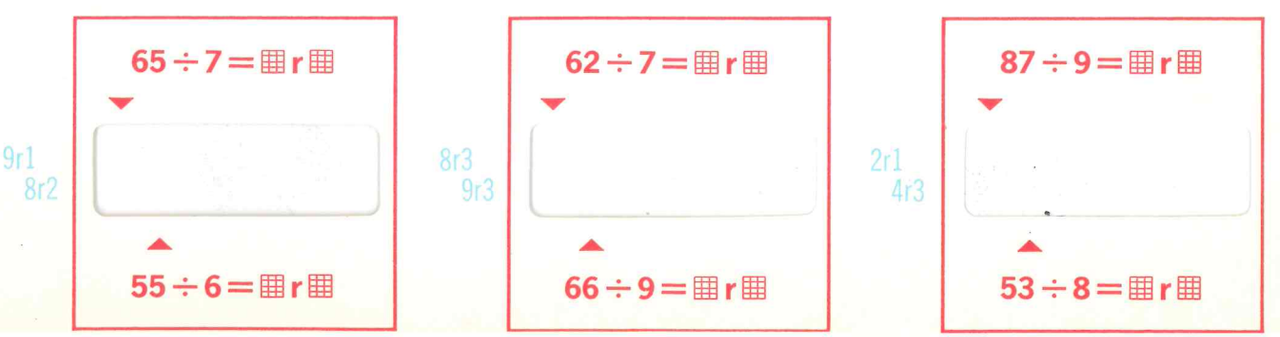

**DIRECTIONS:** **1** — Study the examples on this page. The red numerals in the windows are the right answers.

**2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows where the arrows point.




**3** — To check your work, put your paper or Magic Slate under page 46. See if your answers are the same as the red numerals in the windows.

**NOTE:** Pay no attention to the blue numerals outside the boxes.

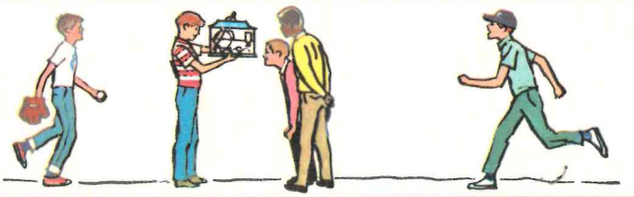


# 2-DIGIT DIVIDENDS WITH REMAINDERS (1)

**A**

Billy had 9 white mice to give away. He wanted his 4 friends to share them equally. How many mice could each friend have?

**9 ÷ 4 = ▦**



**B**

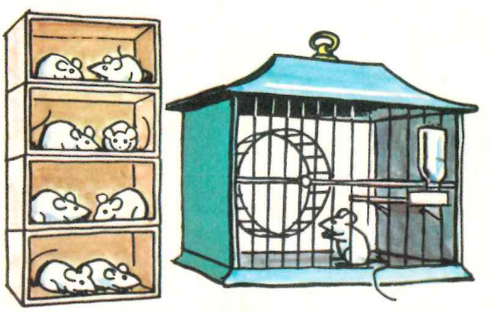
9 mice cannot be divided into 4 equal groups.
Think of the largest number smaller than 9 that **can** be divided into 4 equal groups.

8 ÷ 4 = 2

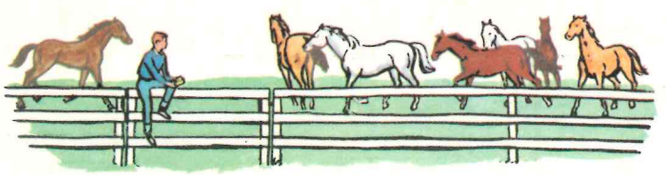
Subtract the 8 mice from the 9 mice: 9 — 8 = 1
1 mouse cannot be divided into 4 equal groups.
The 1 mouse that remained is called the **remainder**.

**9 ÷ 4 = 2r1** **r** means remainder.

Billy gave each friend 2 mice. 1 mouse remained.



**C**



Tom has 54 lumps of sugar to distribute equally among 7 horses. How many lumps of sugar will each horse get?

**54 ÷ 7 = ▦**

**D**

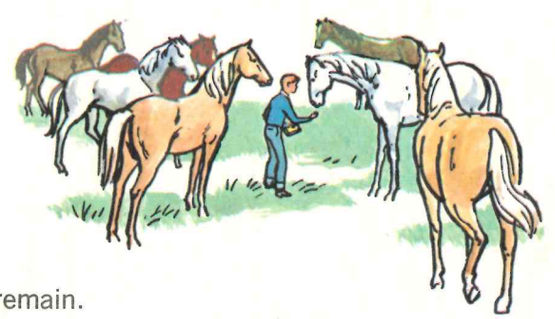
Divide 54 by 7.
54 cannot be divided into 7 equal groups.
Think of the largest number smaller than 54 that **can** be divided into 7 equal groups.

49 ÷ 7 = 7

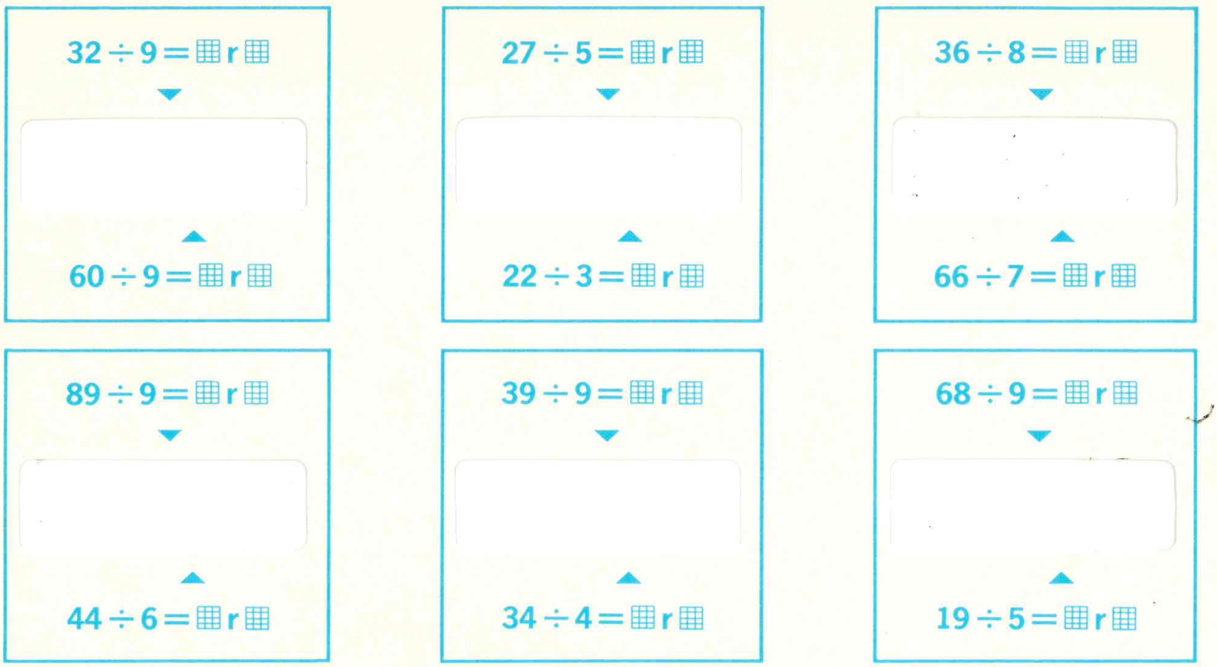
Subtract 49 from 54 to see how much of the dividend remains: 54 — 49 = 5

**54 ÷ 7 = 7r5**

Each horse will get 7 lumps of sugar. 5 lumps remain.

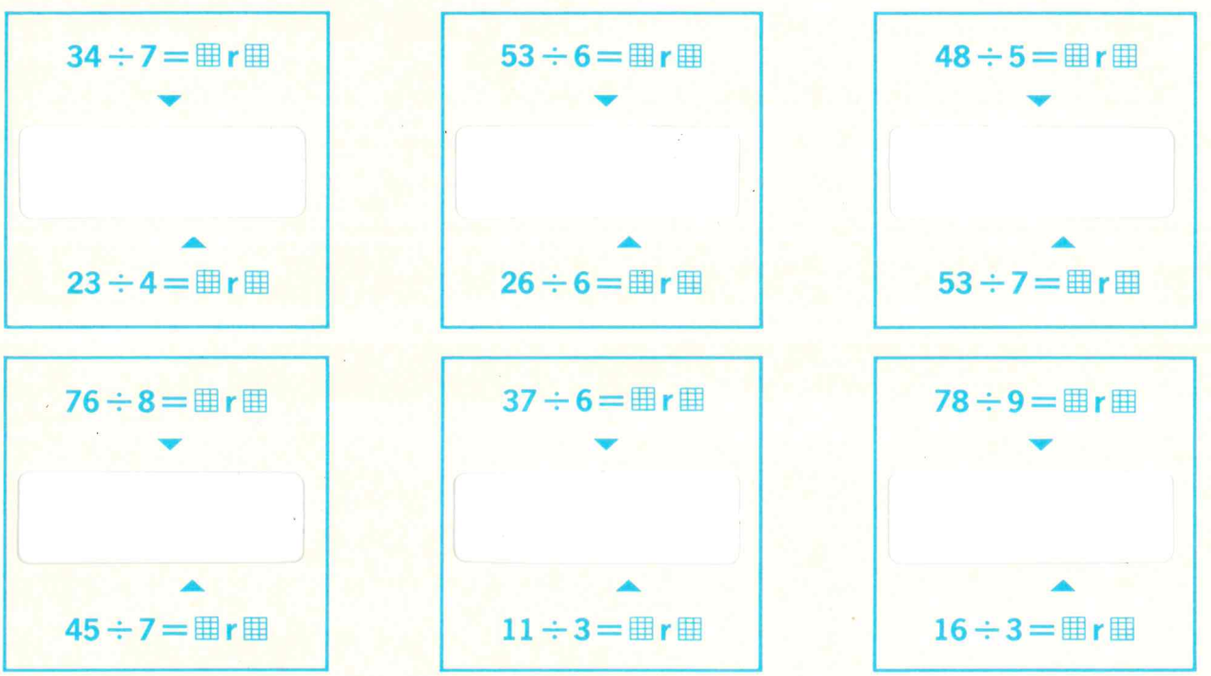


This page is for study only. Study the panels above as you look at the examples on page 48.
DO NOT write through the windows on this page.

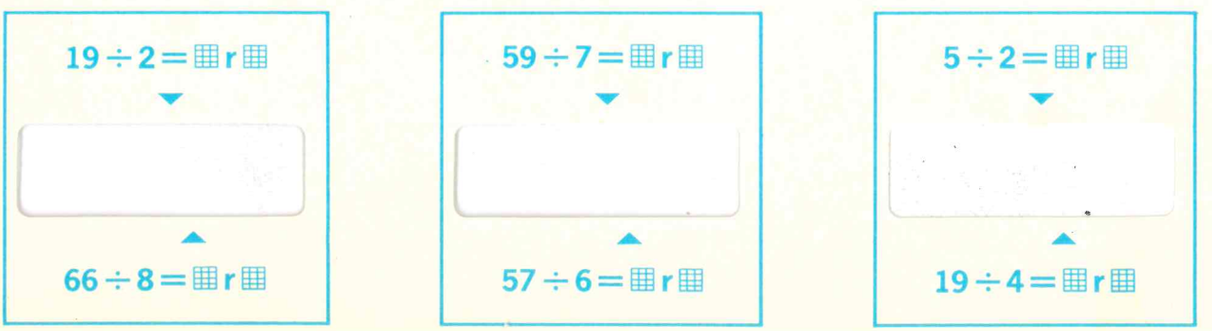



**DIRECTIONS: 1** — Study the examples on this page. The blue numerals in the windows are the right answers.

**2** — Put a piece of paper or a Magic Slate under this page. Write your answers through the windows where the arrows point.




**3** — To check your work, put your paper or Magic Slate under page 48. See if your answers are the same as the blue numerals in the windows.

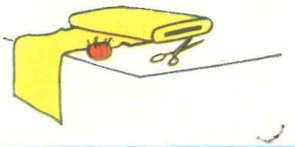


# 2-DIGIT DIVIDENDS WITH REMAINDERS (2)

**A**

It takes 4 yards of cloth to make a coat. How many coats can Jill's mother make from 30 yards of cloth?

**30 ÷ 4 = ▦r▦**



**B**

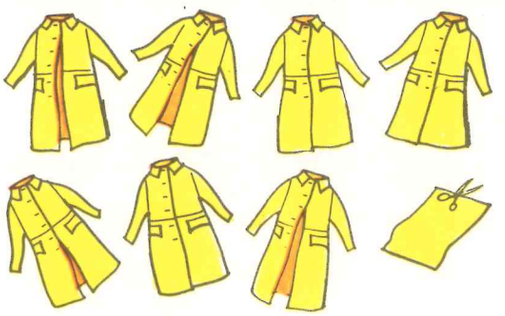
Divide 30 by 4.
30 cannot be divided into 4 equal groups.
Think of the largest number smaller than 30 that **can** be divided into 4 equal groups.

$28 \div 4 = 7$

Subtract to find the remainder: $30 - 28 = 2$

**30 ÷ 4 = 7r2**

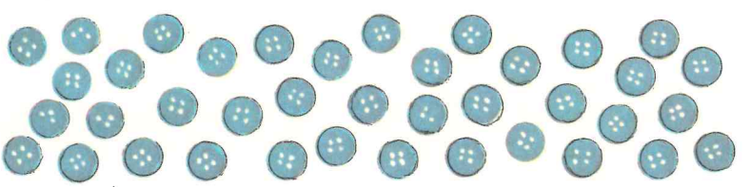
Jill's mother can make 7 coats. She will have 2 yards of cloth left over.



**C**

Jill's mother has 39 buttons. She will sew 6 buttons on each coat. On how many coats will she sew buttons?

**39 ÷ 6 = ▦r▦**



**D**

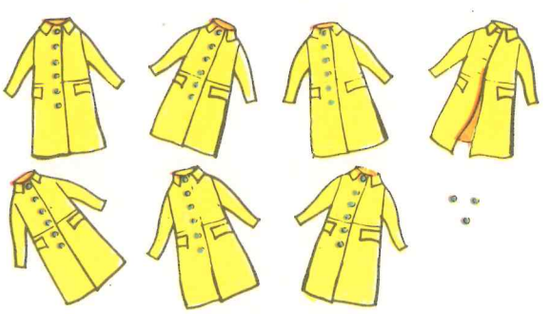
39 cannot be divided into 6 equal groups.
36 is the largest number smaller than 39 that **can** be divided into 6 equal groups.

$36 \div 6 = 6$

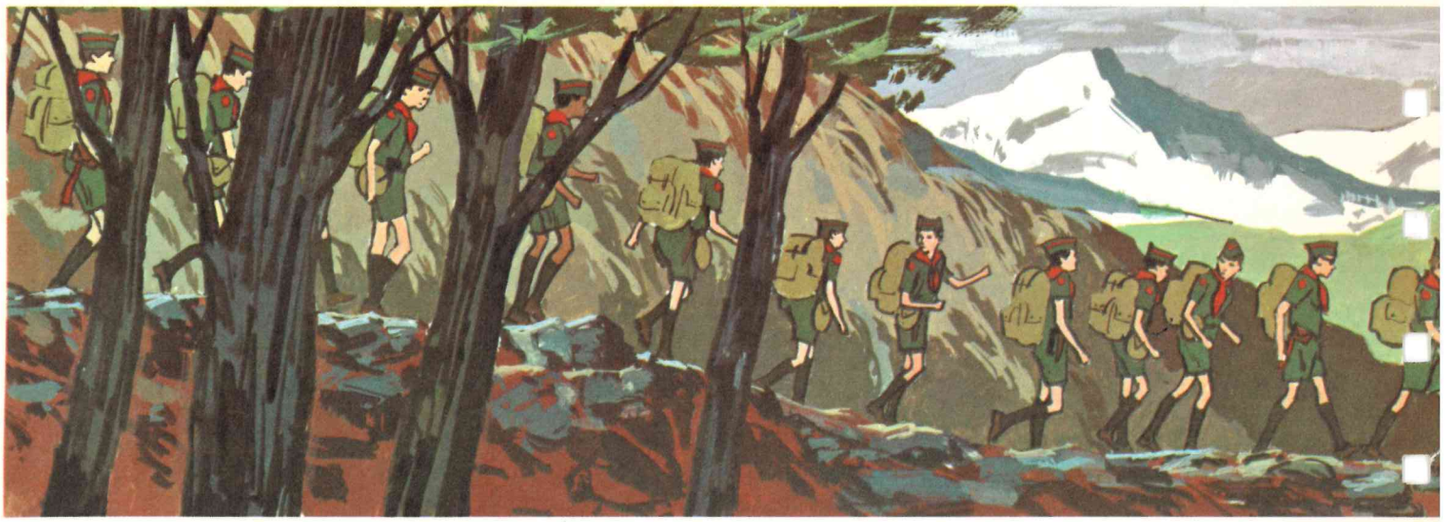
$39 - 36 = 3$ The remainder is 3.

**39 ÷ 6 = 6r3**

Jill's mother will sew buttons on 6 coats. 3 buttons will remain.



## HOW TO DIVIDE



78 Scouts are going on a weekend hike. They will sleep in tents. Each tent will hold 5 Scouts. How many tents will they need to take along?

$$78 \div 5 = \square r \square$$

Perhaps you can find the answer in your head. You have been doing so with examples such as those in Lesson 22. But this example is a little different from the ones in earlier lessons. This one will have **two** digits in the quotient, plus a remainder. Steps 1 through 6 will show you a new method of finding the answer.

partial quotients column

**Step 1**

$5\overline{)78}$

First of all, draw a line down the page to the right of the example. We've drawn ours in blue. The space to the right of the blue line is called the **partial quotients column** (you'll soon see why).

**Step 2**

$5\overline{)78}$
$50 \quad 10$

Now divide the TENS: 7 TENS cannot be divided into 5 equal groups of TENS. What is the largest number of TENS smaller than 7 that **can** be divided evenly by 5? Answer: 5 TENS.
5 TENS $\div$ 5 = 1 TEN  Write 10 in the partial quotients column.
**Multiply**: $10 \times 5 = 50$  Write 50 under 78.
50 shows how much of the dividend has been used.

**Step 3**

$5\overline{)78}$
$50 \quad 10$
$28$

**Subtract**: $78 - 50 = 28$  28 shows how much of the dividend is left.

**Step 4**

$5\overline{)78}$
$50 \quad 10$
$28$
$25 \quad 5$

**Divide**: 28 cannot be divided into 5 equal groups of ONES. 25 is the largest number of ONES smaller than 28 that **can** be divided evenly by 5. $25 \div 5 = 5$
Write 5 in the partial quotients column.
**Multiply:** $5 \times 5 = 25$  Write 25 under 28.

## BY A NEW METHOD

Step 5

```
5)78
  50 | 10
  28
  25 |  5
   3
```

**Subtract**: $28 - 25 = 3$ 3 is the remainder. Now, add the numbers in the partial quotients column in your head: $10 + 5 = 15$ 15 is the total quotient. (The 10 and the 5 are parts of the quotient, which is why we call the column they are written in the **partial quotients** column.)

Step 6

```
 15r3
5)78
  50 | 10
  28
  25 |  5
   3
```

The total quotient and the remainder should be written in the usual place **over** the example. Write the 1 in 15 over the 7 in 78, because both mean TENS. Write the 5 in 15 over the 8 in 78, because both mean ONES.

5 Scouts can sleep in each of 15 tents. 1 more tent will be needed for the remaining 3 Scouts, so they will have to take along 16 tents in all.

### DIRECTIONS FOR THE FOLLOWING PAGES

From here on in this book, the lessons will be arranged in a slightly different way. Most pages will have both Study Panels **and** Practice Examples on them. Please be careful to look at the lesson number—if two or more pages all have the same lesson number, you should read **all** the Study Panels on these pages before you try any of the Practice Examples.

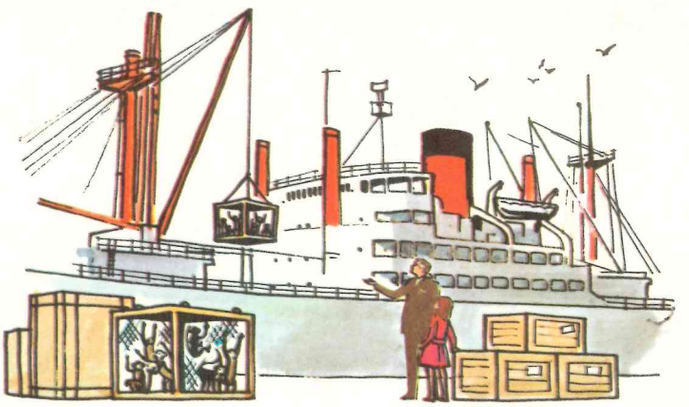
The directions for the following pages will be shorter than usual. You know how the book works, so you should find it easy to use without long directions. The Practice Examples are all division. You will see that each example has a big window below it and a small window above it. You work each example directly **under** it through the big window; then you write the quotient with the remainder through the small window **over** the example. If you have any problem, see where the printed quotient is placed; notice also where the printed work is done.

# UNEVEN DIVISION
## 2-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (1)

**A**

57 monkeys are coming to America on Ellen's father's ship. They will be divided evenly among 4 zoos. The monkeys' owner has promised to give Ellen any monkeys that are left over. How many monkeys will go to each zoo? How many monkeys will Ellen be given?

$4\overline{)57}$



**B**

partial quotients column

$$\begin{array}{r|l} 14\text{ r }1 & \\ 4\overline{)57} & \\ 40 & 10 \\ \hline 17 & \\ 16 & 4 \\ \hline 1 & \end{array}$$

**Divide**: 5 TENS cannot be divided into 4 equal groups of TENS. Think of the largest number of TENS smaller than 5 that **can** be divided evenly by 4. $4\text{ TENS} \div 4 = 1\text{ TEN}$
Write 10 in the partial quotients column.
**Multiply**: $10 \times 4 = 40$ Write 40 under 57. **Subtract**: $57 - 40 = 17$
**Divide**: 17 cannot be divided into 4 equal groups of ONES. 16 is the largest number of ONES smaller than 17 that **can** be divided evenly by 4. $16 \div 4 = 4$ Write 4 in the partial quotients column.
**Multiply**: $4 \times 4 = 16$ Write 16 under 17. **Subtract**: $17 - 16 = 1$
1 is the remainder. Add to find the total quotient: $10 + 4 = 14$
Write the quotient with the remainder in the answer space.
14 monkeys will go to each zoo. There will be 1 monkey left for Ellen.

WHEN YOU WORK THE PRACTICE EXAMPLES ON THE FOLLOWING PAGES

If you make a mistake in your work, erase it from your paper and start again. **But**, if you're using a Magic Slate, don't try to erase—just clean off the slate as usual and begin again.

## PARTS OF UNEVEN DIVISION EXAMPLES

**C**

```
   12r3
6)75
  60 | 10
  15
  12 |  2
   3
```

**Divide** 7 TENS by 6. Think: 6 is the largest number of TENS smaller than 7 that can be divided evenly by 6.
6 TENS ÷ 6 = 1 TEN  10 is the first partial quotient.
**Multiply:** 10 × 6 = 60  Write 60 under 75. 60 shows how much of the dividend has been used. **Subtract:** 75 — 60 = 15
15 shows how much of the dividend is left. It is the "new" dividend. **Divide** 15 by 6. Think: 12 is the largest number of ONES smaller than 15 that can be divided evenly by 6.
12 ÷ 6 = 2  2 is the second partial quotient. **Multiply:** 2 × 6 = 12
Write 12 under 15. 12 shows how much more of the dividend has been used. **Subtract:** 15 — 12 = 3  3 is the remainder.
Add to find the total quotient: 10 + 2 = 12.
Write the quotient with the remainder in the answer space.

7)96

8)99

**D**

divisor → 6)75 ← dividend

part of the dividend used → 60
"new" dividend → 15

partial quotients column

```
6)75
60 | 10 ← first partial quotient
```

```
   12r3 ← quotient and remainder
6)75
  60 | 10 ← first partial quotient
  15
  12 |  2 ← second partial quotient
   3
```

"new" dividend → 15
more of dividend used → 12
remainder → 3

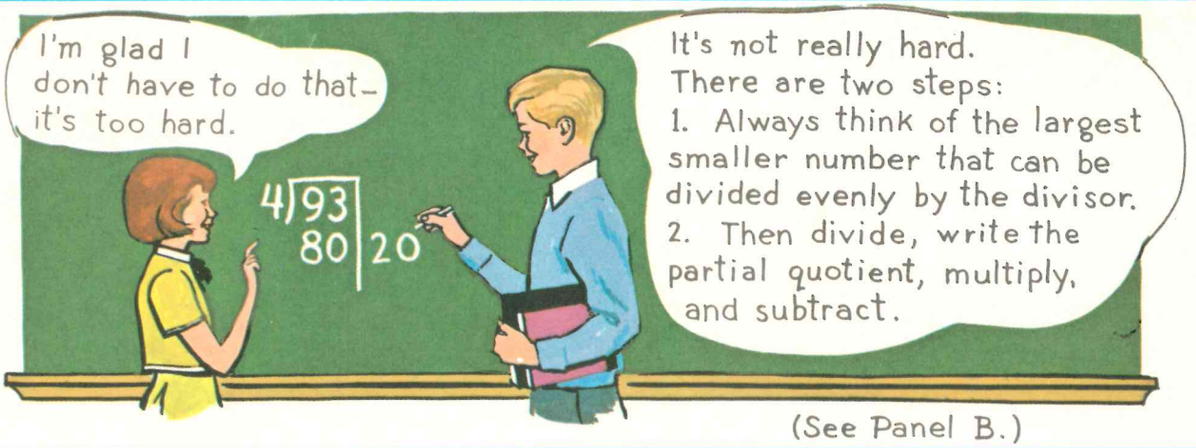
6)90

4)70

**DIRECTIONS:** 1—Read the Study Panels first. 2—Study the Practice Examples. The red numerals in the windows are the right answers. Put your paper or Magic Slate under this page and work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. 3—To check your work, put your paper or Magic Slate under page 57. See if your answers are the same as the red numerals in the windows.

## IT'S NOT AS HARD AS YOU THINK!

A


I'm glad I don't have to do that— it's too hard.
4)93
80 20
It's not really hard. There are two steps:
1. Always think of the largest smaller number that can be divided evenly by the divisor.
2. Then divide, write the partial quotient, multiply, and subtract.

(See Panel B.)

19r2

13r3

30 | 10
29
27 | 9
2

60 | 10
21
18 | 3
3

B

```
  23r1
4)93
 80 | 20
 13
 12 |  3
  1
```

**Divide** 9 TENS by 4. Think: 8 is the largest number of TENS smaller than 9 that can be divided evenly by 4.
8 TENS ÷ 4 = 2 TENS  Write 20 in the partial quotients column.
**Multiply**: 20 × 4 = 80  Write 80 under 93. **Subtract**: 93 — 80 = 13
**Divide** 13 by 4. Think: 12 is the largest number of ONES smaller than 13 that can be divided evenly by 4. 12 ÷ 4 = 3
Write 3 in the partial quotients column. **Multiply**: 3 × 4 = 12
Write 12 under 13. **Subtract**: 13 — 12 = 1  1 is the remainder.
Add to find the total quotient: 20 + 3 = 23
Write the quotient with the remainder in the answer space.

23

12r5

80 | 20
12
12 | 3

70 | 10
19
14 | 2
5

# UNEVEN DIVISION
## 2-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (2)

**C**

It will be Christmas in 86 days. How many weeks are there in 86 days?

$7\overline{)86}$

**D**

$7\overline{)86}$
70 | 10
16

**Divide** 8 TENS by 7. Think: 7 is the largest number of TENS smaller than 8 that can be divided evenly by 7.
7 TENS ÷ 7 = 1 TEN  Write 10 as the first partial quotient.
**Multiply:** 10 × 7 = 70  Write 70 under 86. **Subtract:** 86 — 70 = 16

(See Panel E.)

$3\overline{)85}$ 13r5

70 | 10
26
21 | 3
5

$2\overline{)74}$ 12r3

80 | 10
19
16 | 2
3

**E**

$7\overline{)86}$ 12r2
70 | 10
16
14 | 2
2

**Divide** 16 by 7. Think: 14 is the largest number of ONES smaller than 16 that can be divided evenly by 7.
14 ÷ 7 = 2  Write 2 as the second partial quotient.
**Multiply:** 2 × 7 = 14  Write 14 under 16.
**Subtract:** 16 — 14 = 2  2 is the remainder.
Add the partial quotients to get the total quotient: 10 + 2 = 12
Write the quotient with the remainder in the answer space.
It will be Christmas in 12 weeks and 2 days.

$5\overline{)94}$ 15

60 | 10
30
30 | 5

$2\overline{)31}$ 17r2

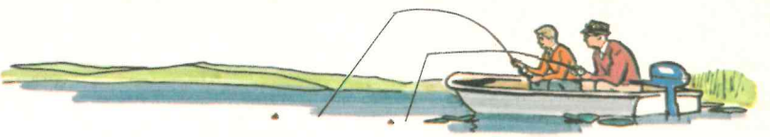
40 | 10
30
28 | 7
2

**DIRECTIONS: 1**—Read the Study Panels first. **2**—Study the Practice Examples. The blue numerals in the windows are the right answers. Put your paper or Magic Slate under this page and work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **3**—To check your work, put your paper or Magic Slate under page 59. See if your answers are the same as the blue numerals in the windows.

# UNEVEN DIVISION
## 2-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (3)

**A**

Ken is 1/4 as old as his grandfather. His grandfather is 64. How old is Ken?



```
  16
4)64
  40 | 10
  24
  24 |  6
   0
```

**Divide** 4 TENS (the largest smaller number) by 4.
4 TENS ÷ 4 = 1 TEN  Write 10 as the first partial quotient.
**Multiply:** 10 × 4 = 40  Write 40 under 64.
**Subtract:** 64 — 40 = 24  **Divide:** 24 ÷ 4 = 6
Write 6 as the second partial quotient.
**Multiply:** 6 × 4 = 24  Write 24 under 24.
**Subtract:** 24 — 24 = 0  There is no remainder.
Add to get the total quotient. Ken is 16 years old.

$.96 r 2¢

```
3)59
```

```
810 | 90
 56
 54 |  6
  2
```

$.78 r 1¢

```
6)81
```

```
420 | 70
 49
 48 |  8
  1
```

**B**

Lisa's mother is 40.
Lisa is 1/3 as old.
How old is Lisa?

```
 13r1
3)40
 30 | 10
 10
  9 |  3
  1
```

**Divide** 3 TENS (the largest smaller number) by 3.
3 TENS ÷ 3 = 1 TEN  10 is the first partial quotient.
**Multiply:** 10 × 3 = 30  Write 30 under 40.
**Subtract:** 40 — 30 = 10  **Divide** 9 ONES (the largest smaller number) by 3.  9 ÷ 3 = 3
3 is the second partial quotient.
**Multiply:** 3 × 3 = 9  Write 9 under 10.
**Subtract:** 10 — 9 = 1  1 is the remainder.
Add the partial quotients. Lisa is 13 1/3 years old.
(1/3 of 1 year = 1/3 of 12 months = 4 months.)

73 r 4

```
4)92
```

```
560 | 70
 28
 24 |  3
  4
```

$.72

```
7)89
```

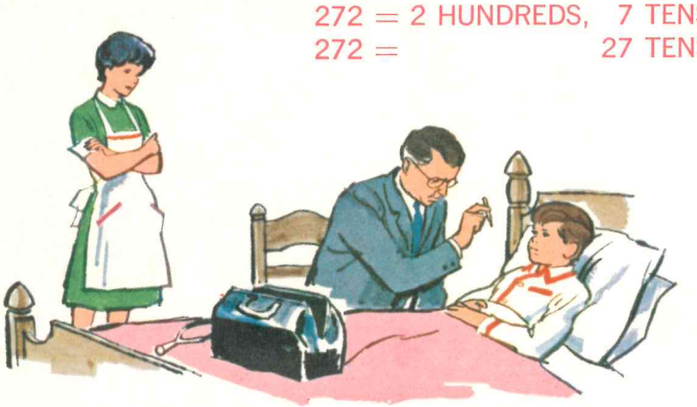
```
490 | 70
 14
 14 |  2
  0
```

**DIRECTIONS: 1**—Read the Study Panels first. **2**—Study the Practice Examples. The red numerals in the windows are the right answers. Put your paper or Magic Slate under this page and work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **3**—To check your work, put your paper or Magic Slate under page 56. See if your answers are the same as the red numerals in the windows.

## 3-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (1)

A

272 = 2 HUNDREDS, 7 TENS, 2 ONES
272 = 27 TENS, 2 ONES



1/8 of 272 children in our school had colds last month. How many children had colds?

$$8\overline{)272}$$

28 r 1

$$5\overline{)138}$$

60 | 20
25
24 | 8
1

37

$$3\overline{)139}$$

60 | 30
14
14 | 7

B

$$\begin{array}{r} 34 \\ 8\overline{)272} \\ 240 \quad 30 \\ \hline 32 \\ 32 \quad 4 \\ \hline \end{array}$$

**Divide** 24 TENS (the largest smaller number) by 8.
24 TENS ÷ 8 = 3 TENS Write 30 as the first partial quotient.
**Multiply**: 30 × 8 = 240 Write 240 under 272.
**Subtract**: 272 — 240 = 32 **Divide**: 32 ÷ 8 = 4
Write 4 as the second partial quotient.
**Multiply**: 4 × 8 = 32 Write 32 under 32.
**Subtract**: 32 — 32 = 0 There is no remainder.
Add to find the total quotient: 30 + 4 = 34
34 children had colds.

18 r 4

$$7\overline{)690}$$

50 | 10
44
40 | 8
4

15 r 1

$$5\overline{)321}$$

20 | 10
11
10 | 5
1

**DIRECTIONS: 1**—Read the Study Panels first. **2**—Study the Practice Examples. The red numerals in the windows are the right answers. Put your paper or Magic Slate under this page and work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **3**—To check your work, put your paper or Magic Slate under page 61. See if your answers are the same as the red numerals in the windows.

# 3-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (2)
# DOLLARS AND CENTS

A

Divide numbers that mean money the way you always divide HUNDREDS, TENS, and ONES. When you have found your answer, put in the dollar sign (**$**) and the decimal point (**.**).

7 children are buying a football that costs $5.98. What will each child's share of the cost be?

7)$5.98

9)$8.66

87r7

640 | 80
63
56 | 7
7

6)$4.69

94r4

540 | 90
28
24 | 4
4

B

$ .85r3¢
7)$5.98
5 60 | 80
38
35 | 5
3

Think of $5.98 as 5 HUNDREDS, 9 TENS, and 8 ONES.
**Divide** 56 TENS (the largest smaller number) by 7.
56 TENS ÷ 7 = 8 TENS  Write 80 as the first partial quotient.
**Multiply**: 80 × 7 = 560  Write 560 under 598.
**Subtract**: 598 — 560 = 38
**Divide** 35 (the largest smaller number) by 7.
35 ÷ 7 = 5  Write 5 as the second partial quotient.
**Multiply**: 5 × 7 = 35  Write 35 under 38.
**Subtract**: 38 — 35 = 3  3 is the remainder.
Add to find the total quotient: 80 + 5 = 85  Put in the $ and . directly above the same signs in the dividend.
Each child will pay $.85. 3 children will each pay 1¢ more.

8)588

20r2

180 | 20
2

7)$5.04

$.47r1¢

160 | 40
29
28 | 7
1

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples. The blue numerals in the windows are the right answers. Put your paper or Magic Slate under this page and work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **3**—To check your work, put your paper or Magic Slate under page 58. See if your answers are the same as the blue numerals in the windows.

# 3-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS (3)

**A**

There were 160 riders
at the horse show.
1/4 of them won prizes.
How many riders won prizes?

```
  40
4)160
  160 | 40
```

**Divide:** 16 TENS ÷ 4 = 4 TENS
Write 40 in the partial quotients column.
**Multiply:** 40 × 4 = 160 Write 160 under 160.
**Subtract:** 160 — 160 = 0 There is no remainder.
40 children won prizes.

27r3

46r1

```
100 | 20
 38
 35 |  7
  3
```

```
120 | 40
 19
 18 |  6
  1
```

**B**

After the show all the riders
stayed for refreshments.
6 riders sat at each table.
How many tables were needed?

```
  26r4
6)160
  120 | 20
   40
   36 |  6
    4
```

**Divide** 12 TENS (the largest smaller number) by 6.
12 TENS ÷ 6 = 2 TENS
Write 20 as the first partial quotient.
**Multiply:** 20 × 6 = 120 Write 120 under 160.
**Subtract:** 160 — 120 = 40
**Divide** 36 (the largest smaller number) by 6.
36 ÷ 6 = 6 Write 6 in the partial quotients column.
**Multiply:** 6 × 6 = 36 Write 36 under 40.
**Subtract:** 40 — 36 = 4 The remainder is 4.
Add the partial quotients.
26 tables were filled. 1 more table was needed for
the 4 remaining riders, making 27 tables in all.

98r4

64r1

```
630 | 90
 60
 56 |  8
  4
```

```
300 | 60
 21
 20 |  4
  1
```

This page is for study only. Read the Study Panels above; then turn to pages 62 and 63 and work the Practice Examples in the usual way.

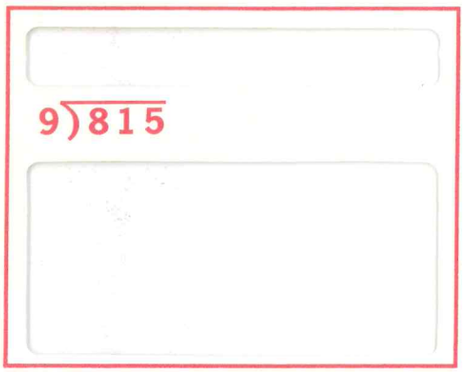
$8\overline{)703}$

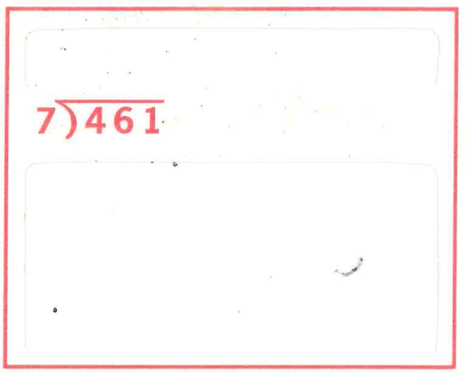
$6\overline{)568}$

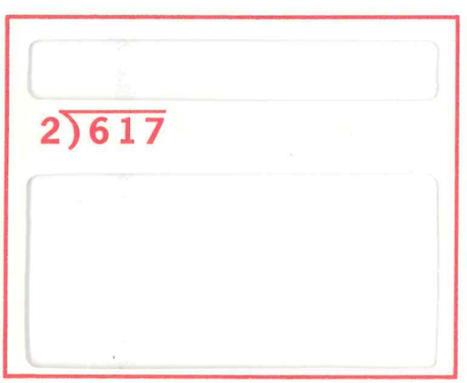
$9\overline{)182}$

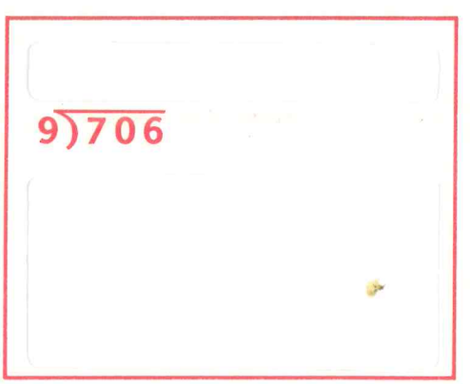
$4\overline{)\$1.89}$

**DIRECTIONS:** **1**—Study the examples above. The red numerals in the windows are the right answers. Put your paper or Magic Slate under this page. Work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **2**—To check your work, put your paper or Magic Slate under page 60. Are your answers the same as the red numerals in the windows?




**DIRECTIONS:** 1—Study the examples above. The red numerals in the windows are the right answers. Put your paper or Magic Slate under this page. Work the examples through the big windows under the examples. Then write the quotients and remainders (if any) through the small windows over the examples. **2**—To check your work, put your paper or Magic Slate under page 65. Are your answers the same as the red numerals in the windows?

# 3-DIGIT QUOTIENTS (1)
# ZERO IN THE QUOTIENT

305 r 1

$1.03 r 3¢

900 | 300
16
15 | 5
1

700 | 100
24
21 | 3
3

**A**

Carol wanted to put the 61 dogs at the school pet show into 3 equal groups. How many dogs should she put in each group?

```
 20 r 1
3)61
 60 | 20
  1 |
```

**Divide:** 6 TENS ÷ 3 = 2 TENS
Write 20 in the partial quotients column.
**Multiply:** 20 × 3 = 60 Write 60 under 61.
**Subtract:** 61 — 60 = 1 The answer is 20 r 1.

Carol cannot divide 61 dogs into 3 equal groups. But she can make 2 groups with 20 dogs in each and 1 group with 21 dogs.

(See Panel C on page 65.)

98 r 2

60 r 7

450 | 90
42
40 | 8
2

540 | 60
7

**B**

```
 108 r 2
6)650
 600 | 100
  50
  48 |   8
   2 |
```

**Divide:** 6 HUNDREDS ÷ 6 = 1 HUNDRED
Write 100 as the first partial quotient.
**Multiply:** 100 × 6 = 600 Write 600 under 650.
**Subtract:** 650 — 600 = 50
**Divide** 48 (the largest smaller number) by 6.
48 ONES ÷ 6 = 8 ONES Write 8 as the second partial quotient.
**Multiply:** 8 × 6 = 48 Write 48 under 50.
**Subtract:** 50 — 48 = 2 The remainder is 2.
Add to find the total quotient: 100 + 8 = 108
Write 108 r 2 in the answer space.

(See Panel D on page 65.)

# THE IMPORTANCE OF ZERO IN THE QUOTIENT

$7\overline{)601}$

90r5

810 | 90
5

$5\overline{)\$5.28}$

65r6

420 | 60
41
35 | 5
6

**C**

$$\begin{array}{r} 20\text{r}1 \\ 3\overline{)61} \\ 60 \\ \hline 1 \end{array} \quad \begin{array}{|l} \\ 20 \\ \hline \\ \end{array}$$

Look at the example. What would happen if you forgot to put the zero in the quotient? Then $61 \div 3$ would seem to equal 2 r 1. But there are more than 2 threes in 61. 2 doesn't make sense. 20 makes sense. $20 \times 3 = 60$
The 0 in ONES place shows that the 2 means 2 TENS.

**D**

$$\begin{array}{r} 108\text{r}2 \\ 6\overline{)650} \\ 600 \\ \hline 50 \\ 48 \\ \hline 2 \end{array} \quad \begin{array}{|l} \\ 100 \\ \hline \\ 8 \\ \hline \\ \end{array}$$

If you forgot the zero in this quotient, $650 \div 6$ would seem to equal 18. You know there are more than 18 sixes in 650; why, 20 sixes are only 120! You can be sure there are at least 100 sixes in 650, because $100 \times 6 = 600$.
You need to put the zero in TENS place in the quotient to show that the 1 stands for HUNDREDS.

$8\overline{)416}$

308r1

600 | 300
17
16 | 8
1

$2\overline{)819}$

78r4

630 | 70
76
72 | 8
4

**E**

Wise Owls Always

1. Remember the importance of zero as a placeholder in the quotient.
2. Put in the dollar sign and decimal point in examples using money.
3. Use the largest smaller number that can be divided evenly by the divisor.
4. Divide, write the partial quotient in the partial quotients column, multiply, and subtract.

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them in the usual way. **3**—To check your work, put your paper or Magic Slate under page 67. See if your answers are same as the blue numerals in the windows.

# 3-DIGIT QUOTIENTS (2)
# ZERO IN THE QUOTIENT

$.68 r 14¢

3)916

3600 | 60
494
480 | 8
14

97 r 31

7)$7.24

7200 | 90
591
560 | 7
31

**A**

At the School Sports, 5 children tied for first place in the broad jump. They jumped a total of 512 inches. How far did each child jump?

```
  102r2
5)512
  500 | 100
   12
   10 |   2
    2 |
```

**Divide:** 5 HUNDREDS ÷ 5 = 1 HUNDRED
Write 100 in the partial quotients column.
**Multiply:** 100 × 5 = 500 Write 500 under 512.
**Subtract:** 512 — 500 = 12
**Divide** 10 (the largest smaller number) by 5.
10 ÷ 5 = 2 Write 2 as the partial quotient.
**Multiply:** 2 × 5 = 10 Write 10 under 12.
**Subtract:** 12 — 10 = 2 Add to find the total quotient.
Each child jumped just over 102 inches.

87 r 60

5)492

5600 | 80
550
490 | 7
60

46

9)547

1200 | 40
180
180 | 6

**B**

274 children entered the relay races. They were divided into 9 teams. How many children were on each team?

```
  30r4
9)274
 270 | 30
   4 |
```

**Divide:** 27 TENS ÷ 9 = 3 TENS
Write 30 as the partial quotient.
**Multiply:** 30 × 9 = 270 Write 270 under 274.
**Subtract:** 274 — 270 = 4 4 is the remainder.
There were 30 children on each team. The 4 remaining children entered another race instead.

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them in the usual way. **3**—To check your work, put your paper or Magic Slate under page 64. See if your answers are the same as the red numerals in the windows.

# DIVIDING BY TENS — 3-DIGIT DIVIDENDS

85r6

70)266

560 | 80
41
35 | 5
6

$1.05r3¢

90)851

500 | 100
28
25 | 5
3

Dividing by TENS is like dividing by ONES.
8 ONES ÷ 2 ONES = 4 ONES  8 TENS ÷ 2 TENS = 4 ONES

**A**

```
   4r31
40)191
 160 | 4
  31
```

Think of 40 as 4 TENS. **Divide:** 19 TENS cannot be divided evenly by 4 TENS. 16 is the largest smaller number of TENS that can be divided evenly by 4.
16 TENS ÷ 4 TENS = 4  Write 4 as the partial quotient.
**Multiply:** 4 × 40 = 160  Write 160 under 191.
**Subtract:** 191 — 160 = 31  31 is the remainder, since it cannot be divided into 40 groups of 1 or more.

**191 ÷ 40 = 4 r 31**

52

20)49

400 | 50
16
16 | 2

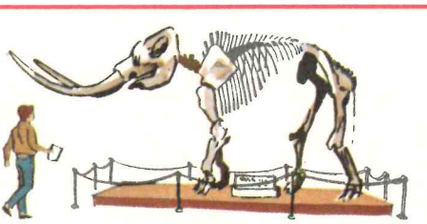
409r1

60)593

800 | 400
19
18 | 9
1

**B**

The school rule is that
1 parent must go on a trip
with every 20 children.
If 64 children are going,
how many parents are needed?



```
   3r4
20)64
 60 | 3
  4
```

**Divide:** 6 TENS ÷ 2 TENS = 3  Write 3 as the partial quotient.
**Multiply:** 3 × 20 = 60  Write 60 under 64.
**Subtract:** 64 — 60 = 4  4 is the remainder.
3 parents can take 60 of the children. Another parent will be needed to take the 4 remaining children, making 4 parents in all.

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them in the usual way. **3**—To check your work, put your paper or Magic Slate under page 69. See if your answers are the same as the red numerals in the windows.

# DIVIDING BY TENS — 4-DIGIT DIVIDENDS

$60\overline{)\$40.94}$ — 62 r 13

432
157
144
13

$80\overline{)7791}$ — \$.93 r 5¢

477
164
159
5

**A**

TENS × TENS = HUNDREDS
**20 × 30 = 600**
**80 × 90 = 7200**

HUNDREDS ÷ TENS = TENS
**600 ÷ 30 = 20**
**7200 ÷ 90 = 80**

**B**

1350 = 1 THOUSAND, 3 HUNDREDS, 5 TENS, 0 ONES
1350 also equals 13 HUNDREDS, 5 TENS, 0 ONES
1350 also equals 135 TENS, 0 ONES

**C**

Joel and Mary are pasting stars on flags. If each flag needs 50 stars, how many flags can they make from 1350 stars? (See Panel D.)

$70\overline{)6150}$ — 74 r 18

658
394
376
18

$30\overline{)1380}$ — 83 r 13

312
130
117
13

**D**

$$\begin{array}{r|l} 27 & \\ \hline 50\overline{)1350} & \\ 1000 & 20 \\ \hline 350 & \\ 350 & 7 \\ \hline & \end{array}$$

**Think:** 10 is the largest number of HUNDREDS smaller than 13 that can be divided evenly by 5 TENS.
**Divide:** 10 HUNDREDS ÷ 5 TENS = 2 TENS
Write 20 as the first partial quotient.
**Multiply:** 20 × 50 = 1000 Write 1000 under 1350.
**Subtract:** 1350 — 1000 = 350
**Divide:** 35 TENS ÷ 5 TENS = 7 ONES
Write 7 in the partial quotients column.
**Multiply:** 7 × 50 = 350 Write 350 under 350.
**Subtract:** 350 — 350 = 0
Joel and Mary can make 27 flags.

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them in the usual way. **3**—To check your work, put your paper or Magic Slate under page 66. See if your answers are same as the blue numerals in the windows.

# FINDING AVERAGES
# ROUNDING 2-DIGIT DIVISORS

3r56

9r41

210 | 3
56

810 | 9
41

A

Jane's marks in spelling were 95, 90, 85, 90, and 80. What was her average mark?

**To Find an Average**

1. **Add all the numbers**: $95 + 90 + 85 + 90 + 80 = 440$
2. **Divide by the number of addends**: $440 \div 5 = 88$
   Jane's average mark was 88. This doesn't mean she got 88 on each test; it means that when we add the five **unequal** marks and divide the total into five **equal** groups, we get 88. We call the number in each equal group the **average**.

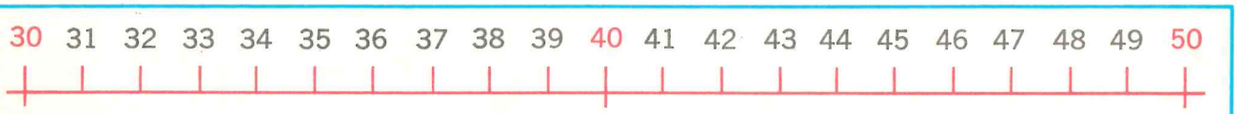
2r9

9r53

40 | 2
9

540 | 9
53

B




Dividing by 31, 34, 39, 42, 48, and other two-place divisors is easy if you **round** the divisor to the nearest TEN.

The nearest TEN to 31 is 30.
30 is nearest to 34.
The nearest TEN to 39 is 40.
40 is nearest to 42.
50 is nearest to 48.

When the ONES digit is 5 or more, round to the nearest **higher** TEN. Round 45 to 50.
When the ONES digit is 4 or less, round to the nearest **lower** TEN. Round 44 to 40.

# OMITTING THE PARTIAL QUOTIENTS COLUMN
# 4-DIGIT DIVIDENDS AND 2-DIGIT DIVISORS

72)4477

53)$49.34

C

## A Faster Way to Divide

Until now we have made a special column for the partial quotients. Now we will divide a faster way. In the examples that follow, write the partial quotients in the answer space as soon as you know them.

D

It is 2616 miles from the Panama Canal to Chile. The *Santa Anna* took 31 days for the trip. What was the average distance traveled each day?

(See Panel E.)

94)6974

39)3250

E

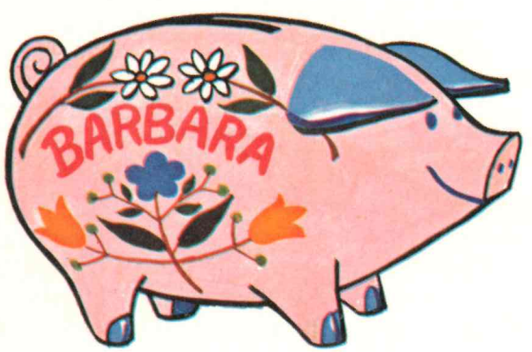
```
    84r12
31)2616
   248
   ---
   136
   124
   ---
    12
```

Round 31 to 30. Use 30 to estimate the quotient.
**Divide** 24 HUNDREDS (the largest smaller number) by 3 TENS.
24 HUNDREDS ÷ 3 TENS = 8 TENS
Write 8 in the TENS place in the quotient.
**Multiply:** 8 TENS × 31 = 248 TENS (248 TENS = 2480, but you don't need to write the 0.) Write 248 (TENS) under 261 (TENS).
**Subtract:** 2616 — 2480 = 136
**Divide:** 12 TENS (the largest smaller number) ÷ 3 TENS = 4
Write 4 in the ONES place in the quotient.
**Multiply:** 4 × 31 = 124 Write 124 under 136.
**Subtract:** 136 — 124 = 12
The *Santa Anna* averaged a little over 84 miles a day.

**DIRECTIONS:** 1—Read the Study Panels on this page and on page 71 first. 2—Study the Practice Examples; then work them the faster way. 3—To check your work, put your paper or Magic Slate under page 68. See if your answers are the same as the red numerals in the windows.

## USING THE FASTER WAY

**F**




Barbara saved $39.62 in 1 year (52 weeks). What was the average amount she saved each week? (Think of $39.62 as 39 HUNDREDS, 6 TENS, and 2 ONES.)

(See Panel G.)

**G**

```
    $  .76r10¢
52)$39.62
   364
   322
   312
    10
```

Round 52 to 50. Use 50 to estimate the quotient.
**Divide** 35 HUNDREDS (the largest smaller number) by 5 TENS.
35 HUNDREDS ÷ 5 TENS = 7 TENS
Write 7 in the TENS place in the quotient.
**Multiply**: 7 TENS × 52 = 364 TENS
Write 364 (TENS) under 396 (TENS).
**Subtract**: 3962 — 3640 = 322
**Divide**: 30 TENS ÷ 5 TENS = 6 ONES
Write 6 in the ONES place in the quotient.
**Multiply**: 6 × 52 = 312 Write 312 under 322.
**Subtract**: 322 — 312 = 10 Put in the $, ., and ¢.
Barbara's savings averaged just over 76¢ a week.

# THE SHORT WAY TO ESTIMATE QUOTIENTS (1)

**A**

Bob rides his bike when he delivers newspapers. In 76 days he rode 340 miles. How many miles did he average per day?

$$76\overline{)340}\quad 4\text{r}36$$
$$304$$
$$36$$

Round 76 to 80. Use 80 as the divisor when you estimate the quotient.
**Divide:** 32 TENS (the largest smaller number) $\div$ 8 TENS = 4 ONES
Write 4 in the ONES place in the quotient.
**Multiply:** $4 \times 76 = 304$ Write 304 under 340.
**Subtract:** $340 - 304 = 36$ The remainder is 36.
Bob averages nearly 4 1/2 miles a day.
(36 is nearly 1/2 of 76.)

**B**

$$76\overline{)340}\quad 4\text{r}36$$
$$304$$
$$36$$

There is a shorter way to estimate the partial quotient.
**Think:** There are about as many groups of 76 in 340 as there are 7's in 34. There are four 7's in 34, so there probably will be four 76's in 340. Try four.
Write 4 in the ONES place in the quotient.
**Multiply:** $4 \times 76 = 304$ Write 304 under 340.
**Subtract:** $340 - 304 = 36$ The answer is 4 r 36.


This page is for study only.

## USING THE SHORT WAY

C

Use the short way

```
   8r3
22)179
  176
  ---
    3
```

**Think:** There are about as many groups of 22 in 179 as there are 2's in 17. There are eight 2's in 17, so there probably will be eight 22's in 179.
Write 8 in the ONES place in the quotient.
**Multiply:** $8 \times 22 = 176$ Write 176 under 179.
**Subtract:** $179 - 176 = 3$

**$179 \div 22 = 8\text{r}3$**

52)374

81)665

D

```
   6r5
34)209
 204
 ---
   5
```

**Think:** There are six 3's in 20, so there probably will be six 34's in 209.
Write 6 in the ONES place in the quotient.
**Multiply:** $6 \times 34 = 204$ Write 204 under 209.
**Subtract:** $209 - 204 = 5$

**$209 \div 34 = 6\text{r}5$**

41)260

92)778

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them the short way. **3**—To check your work, put your paper or Magic Slate under page 75. See if your answers are the same as the blue numerals in the windows.

# THE SHORT WAY TO ESTIMATE QUOTIENTS (2)

**A**

Greg bowled 53 games last year. He had a total of 4994 points. What was his average?

Step 1

```
      9
53)4994
   477
   224
```

**Think**: There are about as many groups of 53 TENS in 4994 as there are 5's in 49. There are nine 5's in 49, so 49 HUNDREDS ÷ 53 probably equals 9 TENS. Write 9 in the TENS place in the quotient.
**Multiply**: 9 TENS × 53 = 477 TENS
Write 477 (TENS) under 499 (TENS).
**Subtract**: 4994 — 4770 = 224

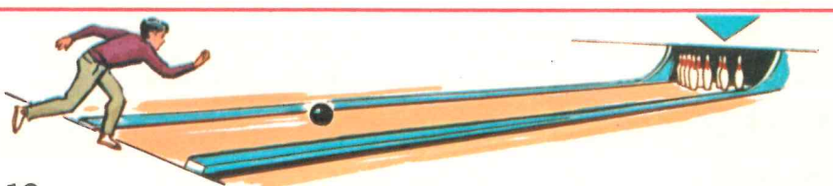
$.23r44¢

34r87

```
104
200
156
 44
```

```
282
463
376
 87
```

**B**



```
      94r12
53)4994
   477
   224
   212
    12
```

Step 2

**Think**: There are about as many groups of 53 in 224 as there are 5's in 22. There are four 5's in 22, so 22 TENS ÷ 53 probably equals 4. Write 4 in the ONES place in the quotient. **Multiply**: 4 × 53 = 212
Write 212 under 224. **Subtract**: 224 — 212 = 12
Greg's average was just over 94 points.

65r4

90r40

```
126
109
105
  4
```

```
396
 40
```



This page is for study only.

# ESTIMATING AN INCORRECT QUOTIENT (1)

A

Step 1

$$\begin{array}{r} 2 \\ 63\overline{)1804} \\ 126 \\ \hline 544 \end{array}$$

**Think**: There will be about as many groups of 63 TENS in 1804 as there are 6's in 18. $18 \div 6 = 3$, so $1804 \div 63$ should be 3 TENS. Warning: try it out in your head before you write anything! $3\text{ TENS} \times 63 = 189\text{ TENS}$ That can't be right! You can't use up 189 TENS if you have only 180. The largest smaller quotient is 2 TENS. Try it; write 2 in the TENS place in the quotient.
**Multiply**: $2\text{ TENS} \times 63 = 126\text{ TENS}$
Write 126 (TENS) under 180 (TENS).
**Subtract**: $1804 - 1260 = 544$

$82\overline{)4874}$ 7r10 364/10

$33\overline{)\$29.86}$ 8r17 648/17

B

Step 2

$$\begin{array}{r} 28\text{r}40 \\ 63\overline{)1804} \\ 126 \\ \hline 544 \\ 504 \\ \hline 40 \end{array}$$

**Think**: There will be about as many groups of 63 in 544 as there are 6's in 54. $54 \div 6 = 9$ $544 \div 63$ should be 9, but try it out in your head first just to be sure. $9 \times 63 = 567$ That's too big—you can't use up 567 if you have only 544. Try the largest smaller number. Write 8 in the ONES place in the quotient. **Multiply**: $8 \times 63 = 504$ Write 504 under 544.
**Subtract**: $544 - 504 = 40$ The remainder is 40.

**$1804 \div 63 = 28\text{r}40$**

$74\overline{)6950}$ 6r14 246/14

$63\overline{)1575}$ 8r42 736/42

**DIRECTIONS: 1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them the short way. **3**—To check your work, put your paper or Magic Slate under page 77. See if your answers are the same as the red numerals in the windows.

## ESTIMATING AN INCORRECT QUOTIENT (2)

**A**

33 classes want to share 1600 library books equally.
How many books should be given to each class?

```
     51r17
33)1700
   165
   ---
    50
    33
    --
    17
```

**Think**: There are five 3's in 17, so 1700 ÷ 3 probably equals 5 TENS. Try it out in your head: 5 TENS × 33 = 165 TENS
That's all right! Write 5 in the TENS place in the quotient.
**Multiply**: 5 TENS × 33 = 165 TENS Write 165 under 170.
**Subtract**: 1700 — 1650 = 50 **Think**: There is one 3 in 5, so 50 ÷ 33 probably equals 1. Write 1 in the ONES place in the quotient.
**Multiply**: 1 × 33 = 33 Write 33 under 50. **Subtract**: 50 — 33 = 17
Each class should receive 51 books. The 17 largest classes could each be given 1 book extra.

73r3
52)$12.40
154
69
66
3

806r5
94)3283
64
53
48
5

**B**

```
     60r5
24)1445
   144
   ---
     5
```

**Think**: 14 ÷ 2 = 7, so 1445 ÷ 24 probably equals 7 TENS.
Try it out in your head first: 7 TENS × 24 = 168 TENS
There are only 144 TENS in the dividend. 70 is the wrong partial quotient. The largest smaller number is 6 TENS. Try it: 6 TENS × 24 = 144 TENS
Write 6 in the TENS place in the quotient.
**Multiply**: 6 TENS × 24 = 144 TENS Write 144 under 144.
**Subtract**: 1445 — 1440 = 5 5 is the remainder.
There are no ONES in the quotient.
Be sure to put zero in the ONES place.

978
21)1369
54
46
42
48
48

$.85r41¢
44)4000
376
276
235
41

**DIRECTIONS:** 1—Read the Study Panels first. 2—Study the Practice Examples; then work them in the usual way. 3—To check your work, put your paper or Magic Slate under page 74. See if your answers are the same as the blue numerals in the windows.

# A SHORTER WAY TO DIVIDE: 4-DIGIT DIVIDENDS AND 1-DIGIT DIVISORS

**A**

```
  453r2
3)1361
  12
  161
  15
   11
    9
    2
```

**Divide** 12 HUNDREDS (the largest smaller number) by 3.
12 HUNDREDS ÷ 3 = 4 HUNDREDS Write 4 in the HUNDREDS place in the quotient.
**Multiply:** 4 HUNDREDS × 3 = 12 HUNDREDS
Write 12 (HUNDREDS) under 13 (HUNDREDS).
**Subtract:** 1361 — 1200 = 161 **Divide:** 15 TENS ÷ 3 = 5 TENS
Write 5 in the TENS place in the quotient.
**Multiply:** 5 TENS × 3 = 15 TENS Write 15 (TENS) under 16 (TENS). **Subtract:** 161 — 150 = 11 **Divide:** 9 ÷ 3 = 3
Write 3 in the ONES place in the quotient. **Multiply:** 3 × 3 = 9
Write 9 under 11. **Subtract:** 11 — 9 = 2 The remainder is 2.

59r36

6)3804

410
774
738
36

$.90r16¢

7)4078

297
16

**B**

A Shorter Way

```
     (a)(b)(c)
      4 5 3 r 2
   ┌──────────
3) 1 3 6 1
   1 2
   ─────
     1 6
     1 5
     ─────
       1 1
         9
       ─────
         2
```

We know which digits mean ONES, TENS, and HUNDREDS, so let's divide by saying:
(a) There are four 3's in 13. Write 4. **Multiply:** 4 × 3 = 12
Write 12 under 13. **Subtract:** 13 — 12 = 1
(b) Bring down the next digit (6) and put it next to the 1.
There are five 3's in 16. Write 5. **Multiply:** 5 × 3 = 15
Write 15 under 16. **Subtract:** 16 — 15 = 1
(c) Bring down the next digit (1). There are three 3's in 11. Write 3. **Multiply:** 3 × 3 = 9 Write 9 under 11.
**Subtract:** 11 — 9 = 2 The remainder is 2.
(We know 453 means 4 **HUNDREDS**, 5 **TENS**, and 3 **ONES**.)

93r68

9)$81.18

666
290
222
68

25

8)5942

126
315
315

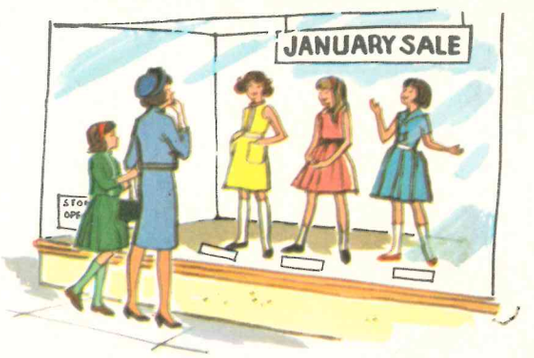
**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them the shorter way. **3**—To check your work, put your paper or Magic Slate under page 79. See if your answers are the same as the blue numerals in the windows.

## THE SHORTER WAY: 4-DIGIT DIVIDENDS AND 2-DIGIT DIVISORS

**A**

Jenny's mother bought 5 dresses that cost a total of $24.90. What was the average cost of each? (Use the shorter method of division.)

(See Panel B.)




$22\overline{)1609}$ 209r6

84
384
378
6

$8\overline{)6453}$ 897r3

56
68
63
52
49
3

**B**

$$\begin{array}{r} \$\ 4.98 \\ 5\overline{)\$24.90} \\ 20 \\ \hline 49 \\ 45 \\ \hline 40 \\ 40 \\ \hline \end{array}$$

Think of $24.90 as 2490. Now divide:
There are four 5's in 24. Write 4 in the quotient.
**Multiply:** $4 \times 5 = 20$ Write 20 under 24.
**Subtract:** $24 - 20 = 4$ Bring down the 9.
There are nine 5's in 49. Write 9 in the quotient.
**Multiply:** $9 \times 5 = 45$ Write 45 under 49.
**Subtract:** $49 - 45 = 4$ Bring down the 0.
There are eight 5's in 40. Write 8 in the quotient.
**Multiply:** $8 \times 5 = 40$ Write 40 under 40.
**Subtract:** $40 - 40 = 0$ Put in the $ and . directly above the same signs in the dividend.
The dresses cost an average of $4.98 each.

$6\overline{)5868}$ 768r2

63
61
54
74
72
2

$47\overline{)\$40.36}$ $4.08r9¢

84
177
168
9

**DIRECTIONS:** **1**—Read the Study Panels on this page and on page 79 first. **2**—Study the Practice Examples; then work them as usual. **3**—To check your work, put your paper or Magic Slate under page 76. Are your answers the same as the red numerals in the windows?

## USING THE SHORTER WAY

**C**

Susan's father sells cloth.
There are 36 inches in a yard.
How many yards are there in
a roll of cloth 7308 inches long?

(See Panel D.)

634

582 r 4

36
20
18
24
24

35
57
56
18
14
4

**D**

$$\begin{array}{r} 203 \\ 36\overline{)7308} \\ 72 \\ \hline 108 \\ 108 \\ \hline \end{array}$$

**Think**: There are two 3's in 7, so there probably will be two 36's in 72. Try it out in your head: $2 \times 36 = 72$ That's all right! Write 2 over the 3 in the dividend, and write 72 under 73. **Subtract**: $73 - 72 = 1$ Bring down the next digit (0). Will 36 go into 10? No. Write 0 over the 0 in the dividend, and bring down the next digit (8). **Think**: There are three 3's in 10, so there will probably be three 36's in 108. Try it: $3 \times 36 = 108$ Write 3 in the quotient. Write 108 under 108. **Subtract**: $108 - 108 = 0$ There are exactly 203 yards in 7308 inches of cloth.

$9.02

742 r 6

81
18
18

56
34
32
22
16
6

## CHECKING UP

A

### Checking Division Examples

You know that multiplication and division are related.
You can use multiplication to check division.

$$\begin{array}{r} 79\text{r}1 \\ 6\overline{)475} \end{array}$$

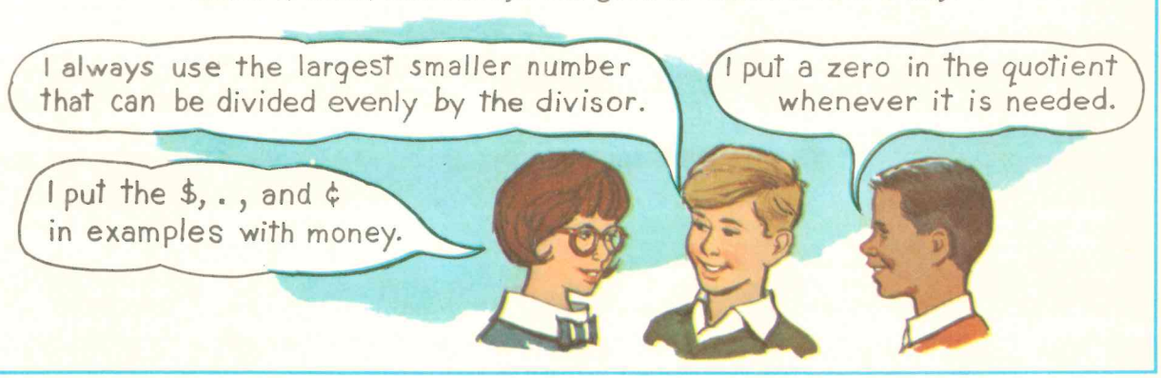
1. Multiply the quotient by the divisor: $6 \times 79 = 474$
2. Add the remainder to the product: $474 + 1 = 475$
3. The product + the remainder will equal the dividend if the quotient is correct.

$42\overline{)8784}$

$7\overline{)6282}$

B

Richard, Mark, and Marilyn are good at division. Here's why:


I always use the largest smaller number that can be divided evenly by the divisor.
I put a zero in the quotient whenever it is needed.
I put the $, . , and ¢ in examples with money.

$9\overline{)6914}$

$21\overline{)\$85.77}$

**DIRECTIONS:** **1**—Read the Study Panels first. **2**—Study the Practice Examples; then work them in the usual way. **3**—To check your work, put your paper or Magic Slate under page 78. See if your answers are the same as the blue numerals in the windows.

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